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THE TREATY OF BERLIN.

THE Treaty of Berlin, which was signed on the 13th of July 1878, has effected great and important changes in the political geography of the Balkan Peninsula. In our number for October 1876 (p. 258), at the time when Servia and Montenegro took up arms in the cause of their brethren who were struggling to free themselves from the Turkish yoke, we furnished our readers with maps and statistical tables showing the then political divisions of the Peninsula, the density of population, the nationalities, and the distribution of Muslims. This information marked the starting point for future changes, and the direction which they must inevitably take.

The failure of the Conference was the reason that these inevitable changes had to be effected by means of a sanguinary contest, instead of through peaceful negotiation. The forcible means, however, resulted in the changes being more thorough and more complete. Last autumn the war between Turkey and Russia was at its height, but by the end of the year the rotten fabric of Turkish dominion had fallen to pieces, and the Russian army was at the gates of Constantinople. In our number for October 1877 (p. 252) we gave a map of the seat of war, which covered the space from Shumla to Plevna and from the Danube to Philippopolis, including the Balkan range.

The Russians dictated a preliminary Treaty at San Stefano, the main effect of which was to free the Bulgarian people from the Turkish yoke, as well as a portion of old Servia, and to extend the boundaries of Montenegro. But nothing was done to deliver the Bosnians and Herzegovinans from their oppressors, or to emancipate the Greek populations. We gave a map showing the new boundaries as arranged by the Treaty of San Stefano, in our number for April 1878 (*facing* p. 101). Those boundaries, so far as they relate to Bulgaria, were drawn in accordance with Kiepert's ethnological map of the Balkan Peninsula.

This preliminary Treaty has now been superseded by the permanent Treaty of Berlin, which has secured the destruction of Turkish power in Europe, by adopting the "bag and baggage" policy of Mr. Gladstone. In his famous pamphlet on the Bulgarian massacres, the English Statesman declared that, while the military integrity of the Ottoman Empire ought to be maintained, every Turkish official must be expelled "bag and baggage" from the provinces of Bosnia, Herzegovina, and Bulgaria. The Treaty of Berlin provides that Turkish officials shall be expelled "bag and baggage," not only from the provinces named by Mr. Gladstone, but also from the Sanjak of Nish, and from part of Thessaly, while Cyprus has also been freed from the horrors of Turkish misrule.

The change thus effected is one of great magnitude, and it is one which must lead, in a few years, to still more complete changes in the right direction—the direction of freedom and of justice. Two years ago Roumania and Servia were tributary States of Turkey; Montenegro, though ever free, was exposed to periodical attacks and devastation; while Bosnia, Herzegovina, Bulgaria, Nish, and Cyprus were groaning under the Turkish yoke. Now Roumania, Servia, and Montenegro are recognised as independent States with accessions of territory, Bosnia and Herzegovina are to be administered by a civilized European power, Bulgaria is to receive administrative autonomy, and Cyprus is also freed from the Turks.

According to the San Stefano Treaty, Bulgaria was to have formed one compact tributary State, with boundaries co-extensive with those indicated on Kiepert's map as enclosing the region in which the Bulgarians form the majority of the inhabitants. The change introduced by the Treaty of Berlin is mischievous and unjust. Instead of one compact State, there are to be two States somewhat differently constituted. The region between the Balkans and the Danube is to be called "Bulgaria," and is to be an autonomous and tributary Principality under the suzerainty of the Sultan, with an elected Prince, a Christian Government, and a national militia. But the Bulgarians south of the Balkans are to be under the political and military authority of the Sultan, with a Christian Governor-General appointed by the Sultan with the consent of the other Powers, and administrative autonomy. This province has received the absurd name of "Eastern Roumelia." Internal order is to be maintained by local police, the Sultan is not allowed to employ Circassians or Bashi-Bazouks in the frontier garrisons, the regular troops forming those garrisons may not in any case be billeted on the inhabitants, and in passing through the province they are not to be allowed to sojourn there.

The differences thus introduced between the condition of the Bulgarians north and south of the Balkans, though slight and unimportant, are mischievous so far as they go, for they furnish the germs of future discontent and disturbance. The same blunder was committed when Roumania was separated into the two Principalities of Wallachia and Moldavia,

while the people desired to form one nation. In that case the union was effected by the will of the inhabitants without bloodshed, and it is to be hoped that the evil done by this unwise severance of the two Bulgarias may hereafter be remedied in the same way.

The frontier of the new Principality of Bulgaria is thus defined by the Treaty of Berlin:—

"It follows, on the north, the right bank of the Danube from the former frontier of Servia up to a point to be determined by an European Commission to the east of Silistria, and thence runs to the Black Sea to the south of Mangalia, which is included in Roumanian territory. The Black Sea forms the eastern boundary of Bulgaria. On the south the frontier follows upwards from its mouth the mid-channel of the brook, near which are situated the villages of Hodzakioj, Selam-Kiōj, Aivadsik, Kulibe, Sudzuluk, crosses obliquely the valley of the Deli-Kamcik, passes south of Belibe and Kemhalik and north of Hadzimahale, after having crossed the Deli-Kamcik at 2½ kilom. above Cengei, reaches the crest at a point situated between Tekenlik and Aidos-Bredza, and follows it by Karnabad Balkan, Prisevica Balkan, Kazan Balkan, to the north of Kotel as far as Demir Kapu. It proceeds by the principal chain of the Great Balkan, the whole length of which it follows up to the summit of Kosica.

"There it leaves the crest of the Balkan, descends southwards between the villages of Pirtop and Duzanci, the one being left to Bulgaria and the other to Eastern Roumelia, as far as the brook of Tuzlu Dere, follows that stream to its junction with the Topolnica, then the latter river until it meets the Smovskio Dere, near the village of Petricevo, leaving to Eastern Roumelia a zone with a radius of 2 kilom., above that junction, ascends between the brooks of Smovskio Dere and the Kamenica, following the line of the watershed so as to turn to the south-west at the level of Voinjak and reach directly the point 875 of the Austrian Staff map.

"The frontier line cuts at right angles the upper basin of the brook of Ichtiman Dere, passes between Bogdina and Karaúla, so as to rejoin the line of the watershed separating the basins of the Isker and the Marica, between Camurli and Hadzilar, follows that line by the summits of Velina Mogila, the 'col' 531 Zmailica Vrh, Sumnatica, and rejoins the administrative boundary of the Sandjak of Sofia between Sivri Tas and Cadir Tepe.

"From Cadir Tepe, the frontier, taking a south-westerly direction, follows the watershed between the basins of the Mesta Karasu, on the one side, and the Struma Karasu on the other, runs along the crests of the mountains of Rhodope called Demir Kapu, Iskoftepe, Kadimesar Balkan, and Aiji Gedük up to Kapetnik Balkan, and thus joins the ancient administrative frontier of the Sandjak of Sofia.

"From Kapetnik Balkan the frontier is indicated by the watershed between the valleys of the Rilska reka, and of the Bistrica reka, and follows the ridge called Vodenica Planina, descending into the valley of the Struma at the junction of this river with the Rilska reka, leaving the village of Barakli to Turkey. It ascends then south of the village of Jelesnica, and reaches by the shortest line the chain of Golema Planina at the summit of Gitka, and rejoins there the former administrative frontier of the Sandjak of Sofia, leaving, however, to Turkey the whole of the basin of the Suha reka.

"From Mount Gitka the western frontier goes towards Mount Crni Vrh by the mountains of Karvena Jabuka, following the former administrative limit of the Sandjak of Sofia in the upper part of the basins of Egrisu and of the Lepnica, ascends with it the crests of Babina Polana, and reaches at Mount Crni Vrh.

"From Mount Crni Vrh the frontier follows the watershed between the Struma and the Morava by the summits of the Streser, Vilogolo, and Mesid Planina, rejoins by the Gacina, Crna Trava, Darkovska, and Dranica Plan, then the Descani Kladanec, the watershed of the High Sukowa and of the Morava, goes straight to the Stol, and descends from it so as to cut the road from Sofia to Pirot, 1000 mètres north-west of the village of Segusa. It ascends in a straight line the Vidlic Planina, and thence Mount Radocina in the chain of the Kodza Balkan, leaving to Servia the village of Doikinci, and to Bulgaria that of Senakos.

"From the summit of Mount Radocina the frontier follows, towards the west, the crest of the Balkans by Ciprovec Balkan and Stara Planina up to the former eastern frontier of the Principality of Servia, near to the Kula Smiljova Cuka, and thence that former frontier as far as the Danube, which it joins at Rakovitza."

This arrangement finally destroys the military power of the Turks in the direction of the Danube. Before the war these invaders held the impregnable fortress of Shumla, the first-class fortresses of Widdin, Rustchuk, and Silistria on the Danube, and Varna on the Black Sea. In former wars these strongholds enabled the Turks to hold their own, and maintain their ground against the whole power of Russia. But henceforward the Danube waters will be neutral, all the above strongholds will be razed, Turkish officials will be removed "bag and baggage," and the Bulgarian plains will cease to be the periodical theatre of desperate and indecisive conflicts. This alone is a clear gain for humanity.

The boundaries of the new province of "Eastern Roumelia" are thus defined by the Treaty of Berlin:—

"Starting from the Black Sea the frontier follows upwards from its mouth the mid-channel of the brook, near which are situated the villages of Hodzakiōj, Selam-Kiōj, Aivadsik, Kulibe, Sudzuluk, crosses obliquely the Valley of the Deli Kamcik, passes to the south of Belibe and Kemhalik, and north of Hadzimahale, after having crossed the Deli Kamcik at a distance of 2½ kilom. above Cengei, reaches the crest at a point situated between Tekenlik and Aidos-Bredza, and follows it by Karnabad Balkan, Prisevica Balkan, Kazan Balkan, to the north of Kotel as far as Demir Kapu. It proceeds by the principal chain of the Great Balkan, which it follows throughout its whole length to the summit of Kosica.

"At this point the western frontier of Roumelia leaves the crest of the Balkan, descends southwards between the villages of Pirtop and Duzanci—the one being left to Bulgaria and the other to Eastern Roumelia—as far as the brook of Tuzlu Dere; follows that stream to its junction with the Topolnica; then the latter river until it meets the Smovskio Dere, near the village of Petricevo, leaving to Eastern Roumelia a zone with a radius of 2 kilom. above that junction; ascends between the brooks of the Smovskio Dere and the Kamenica, following the line of the watershed so as to turn to the south-west at the level of the Voinjak, and reach directly the point 875 of the Austrian Staff map.

"The frontier line cuts at right angles the upper basin of the brook of Ichtiman Dere, passes between Bogdina and Karaúla so as to rejoin the line of the watershed separating the basins of the Isker and the Marica, between Camurli and Hadzilar; follows that line by the summits of Velina Mogila, the 'col' 531, Zmailica Vrh, Sumnatica, and rejoins the administrative boundary of the Sandjak of Sofia between Sivri Tas and Cadir Tepe.

"The frontier of Roumelia leaves that of Bulgaria at Mount Cadir Tepe, following the line of the watershed between the basins of the Marica and of its affluents on one side, and of the Mesta Karasu and of its affluents on the other, and takes the direction south-east and then

south along the crest of the Despoto Dagh Mountains, towards Mount Kruschowa (whence starts the frontier line of the Treaty of San Stefano).

"From Mount Kruschowa the frontier is the same as the line laid down by the Treaty of San Stefano, that is to say, the chain of the Black Balkans (Kara Balkan), the mountains Kulaghy-Dagh, Eschek-Tschepellū, Karakolas, and Ischiklar, from whence it descends due south-east till it reaches the River Arda, and follows the mid-channel of this river up to a point close to the village of Adacali, which remains to Turkey.

"From this point the frontier line ascends the crest of the Bestepe-Dagh, which it follows; then descends and crosses the Maritza, at a point situated 5 kilom. above the bridge of Mustafa Pasha; thence it takes a northerly direction by the line of the watershed between Demirhanli Dere and the small affluents of the Maritza to Küdeler Baïr, whence it runs east to Sakar Baïr; from this point it crosses the valley of the Tundza in the direction of Büjük Derbend, which is left to the north, as also is Soudzak. From Büjük Derbend it regains the line of the watershed between the affluents of the Tundza on the north and those of the Maritza on the south, up to the level of Kaibilar, which is included in Eastern Roumelia, and passes to the south of V. Almali between the basin of the Maritza to the south and the various streams which flow straight into the Black Sea, between the villages of Belevrin and Alatli; it follows to the north of Karanlik the crests of Vosna and Zuvak, the line which separates the waters of the Duka and those of the Karagac-Su, and rejoins the Black Sea between those two rivers."

These boundaries include the Sanjak of Philippopolis, the scene of the horrible atrocities of 1876, which is thus for ever freed from Turkish misrule, and, after order has been established, from the recurrence of similar calamities.

The independence of Montenegro is recognised by all the great Powers of Europe, and by the Sultan; and thus the heroic struggle of four centuries is crowned with the success it has so nobly won. Moreover, the gallant mountaineers have driven the Turks from the frontier fortresses of Nicsics, Spuz, and Podgoritza; have secured for themselves a seaport in the Adriatic; and have extended their frontiers. Their new boundary, as finally arranged, is as follows:—

"Starting at Ilino-brdo, to the north of Klobuk, the line descends to the Trebinjcica towards Grancarevo, which remains to Herzegovina, then ascends the course of that river up to a point 1 kilom. below its confluence with the Cepelica, and from thence passes by the most direct line on to the heights which border the River Trebinjcica. It then proceeds in the direction of Pilatova, leaving that village to Montenegro, and continues along the heights in a northerly direction, maintaining as far as possible a distance of 6 kilom. from the Bilek-Korito-Gacko road, up to the 'col' between the Somina Planina and Mount Curilo, whence it proceeds in an easterly direction by Vratkovici, leaving this village to Herzegovina, up to Mount Orline. Starting from this point, the frontier, leaving Ravno to Montenegro, goes straight to the north-north-east, crossing the summits of the Lebersnik and of the Volujak,, then descends by the shortest line on to the River Piva, which it crosses, and rejoins the River Tara, passing between Crkvica and Nedvina. From this point it ascends the Tara to Mojkovac, from which place it passes along the crest of the ridge as far as Siskojezero. Leaving this point, it coincides with the former frontier as far as the village of Sekulare. From there the new frontier passes along the crests of the Mokra Planina, the village of Mokra remaining to Montenegro; it then reaches the point 2166 on the Austrian Staff map, following the principal chain and the line of the watershed between the Lim on the one side, and the Drin as well as the Cievna (Zem) on the other.

"It then coincides with the existing boundaries between the tribe of the Kuci-Drekalovici on one side, and the Kucka-Krajna, as well as the tribes of the Klementi and Grudi, on the other, to the plain of Podgorica, from whence it proceeds towards Plavnica, leaving the Klementi, Grudi, and Hoti tribes to Albania.

"Thence the new frontier crosses the lake near the islet of Gorica-Topal, and, from Gorica-Topal, takes a straight line to the top of the crest, whence it follows the watershed between Megured and Kalimed, leaving Mrkovic to Montenegro, and reaching the Adriatic at V. Kruci.

"On the north-west the frontier will be formed by a line passing from the coast between the villages of Susana and Zubci, and terminating at the extreme south-east point of the existing frontier of Montenegro, on the Vrsuta Planina."

Thus Montenegro receives the seaport of Antivari and the coast belonging to it; as well as full and entire liberty of navigation on the Boyana, and the lake of Scutari.

Two years ago Servia declared war upon the Turks, with the object of assisting her compatriots who were engaged in an unequal struggle against their oppressors; and though unable to stand up against the whole strength of the Ottomans, and beaten down for a time, she once more drew the sword and advanced in aid of the Russian army. Free Servia is bound to take every opportunity that occurs to emancipate old Servia from Turkish misrule, and the wisdom of her policy is shown by the result. She now ceases to be a tributary State, and all the Powers of Europe have recognised her complete independence. Moreover, she receives a large accession of territory, including the Sanjak of Nish, and comprised within the following boundaries:—

"The new frontier follows the existing line ascending the mid-channel of the Drina from its confluence with the Save, leaving Mali Zvornik and Sakhar to the Principality, and continues to follow the former boundary of Servia as far as the Kopaonik, leaving it at the summit of the Kanilug. From that point it follows at first the western boundary of the Sandjak of Nish by the southern spur of the Kopaonik, by the crests of the Marica and Mrdar Planina, which form the watershed between the basins of the Ibar and Sitnica on one side, and that of the Toplica on the other, leaving Prepolac to Turkey.

"It then turns to the south by the watershed between the Brvenica and the Medvedja, leaving the whole of the basin of the Medvedja to Servia; follows the crests of the Goljak Planina (which forms the watershed between the Kriva-Rjeka on one side and the Poljanica, Veternica, and Morava on the other), as far as the summit of the Poljanica. It then follows the spur of the Karpina Planina as far as the confluence of the Koinska and the Morava, crosses this river, and ascends by the watershed between the Koinska brook and the stream which falls into the Morava near Neradovce, to gain the Sveti Ilija Planina above Trgoviste. Thence it follows the crest of the Sveti Ilija as far as Mount Kljuc, and passing by the points marked 1516 and 1547 on the map, and by the Babina Gora, it reaches Mount Crni-Vrh.

"From Mount Crni-Vrh, the new delimitation coincides with that of Bulgaria, that is to say:—

"The line of frontier follows the watershed between the Struma and Morava by the summits of Streser, Vilogolo, and Mesid Planina, rejoins by the Gacina, Crna Trava, Darkovska, and Drainica Planina, then the Descani Kladanec, the watershed, of the High Sukova and

of the Morava, goes straight to the Stol, and descends from it so as to cut the road from Sofia to Pirot at a point 1000 mètres north-west of the village of Segusa. It ascends in a straight line the Vidlic Planina, and thence Mount Radocina in the chain of the Kodza Balkan, leaving to Servia the village of Doikinci, and to Bulgaria that of Senakos.

"From the summit of Mount Radocina the frontier follows towards the north-west, the crest of the Balkans by Ciprovec Balkan and Stara Planina up to the former eastern frontier of the Principality of Servia, near to the Kula Smiljova cuka, and thence follows that former frontier as far as the Danube, which it rejoins at Rakovitza."

The Roumanians, whose conspicuous gallantry and devotion in the recent war have received universal recognition, gain for themselves complete independence; and, while giving up to Russia the portion of Bessarabia detached from that power by the Treaty of Paris in 1856, they receive in exchange the islands forming the delta of the Danube, the Sanjak of Tulcha, and the territory south of the Dobruja as far as a line drawn from Silistria on the Danube to Mangalia on the Black Sea.

Bosnia and Herzegovina are to be occupied and administered by Austria, and are thus rescued from Turkish misrule, while the Austrians reserve the right of keeping garrisons and having military and commercial roads in the Sanjak of Novi-Bazar.

The great blots in the Treaty of Berlin are the handing over of Bosnia and Herzegovina to Austria, and of Lazistan to Russia, without the consent of—and against the wishes of—the inhabitants, and the abandonment of the cause of the Greeks. It is true that a rectification of the Greek frontier is suggested, the new line following the valley of Salamyrias (the ancient Peneus) on the side of the Ægean Sea, and that of the Calamas on the side of the Ionian Sea. But there is obvious insincerity in the clause which contains this suggestion, while the brave Cretans, who have been so gallantly struggling for their freedom, are shamefully handed over to Turkish misrule. The unjust treatment of the Greeks is as short-sighted as it is dishonourable, and ensures the re-opening of the Eastern question in the near future.

But on the whole the Treaty of Berlin has made a very great and beneficial change in the political geography of Eastern Europe. Three independent States have been recognised with extended frontiers, a tributary Principality and an autonomous Province have been created, and two large and rich, but long-misgoverned Provinces have been placed under the rule of a civilized Government, while the whole of these territories have been for ever rescued from the anarchical oppression of the Turkish invaders. A very few years will mark the beneficial effects of these changes, by the increasing population and material prosperity, and by the revival of trade and agricultural enterprise.

In Asia the Russians have acquired additional territory, which includes Kars and the port of Batoum. The new Armenian boundary is thus defined:—

"The Sublime Porte cedes to the Russian Empire in Asia the territories of Ardahan, Kars, and Batoum, together with the latter port, as well as all the territories comprised between the former Russo-Turkish frontier and the following line:—

"The new frontier starting from the Black Sea, and coinciding with the line laid down by the Treaty of San Stefano as far as a point to the north-west of Khorda, and to the south of Artwin, continues in a straight line as far as the River Tchoroukh, crosses this river and passes to the east of Aschmichen, going in a straight line to the south so as to rejoin the Russian frontier indicated in the Treaty of San Stefano, at a point to the south of Nariman, leaving the town of Olti to Russia. From the point indicated near Nariman the frontier turns to the east, passes by Tebrenec, which remains to Russia, and continues as far as the Pennek Tschaï.

It follows this river as far as Bardouz, then turns towards the south, leaving Bardouz and Jönikioy to Russia. From a point to the west of the village of Karaougan, the frontier takes the direction of Medjingert, continues in a straight line towards the summit of the mountain Kassadagh, and follows the line of the watershed between the affluents of the Araxes on the north and those of the Mourad Sou on the south, as far as the former frontier of Russia.

"His Majesty the Emperor of Russia declares that it is his intention to constitute Batoum a free port, essentially commercial.

"The valley of the Alaschkerd and the town of Bayazid, ceded to Russia by Article XIX. of the Treaty of San Stefano, are restored to Turkey.

"The Sublime Porte cedes to Persia the town and territory of Khotour, as fixed by the mixed Anglo-Russian Commission for the delimitation of the frontiers of Turkey and of Persia."

RICHTHOFEN ON PREJEVALSKY'S JOURNEY IN CENTRAL ASIA.

SIX hundred years ago Marco Polo told of the horrors of the desert of *Lop*, of which Europeans had not previously heard. From *Cotam* (Khotan) the great traveller had made his way past *Pein* and *Ciarcian* (the site of which has, of late years, been fixed by Colonel Henry Yule), through deserts where thinly populated places lay at intervals, till he reached the town of Lop. "Lop," he says, "is a large town at the edge of the desert which is called the desert of Lop. It belongs to the great Kaan, and the people worship Mahommet. Now, such persons as propose to cross the Desert, take a week's rest in this town to refresh themselves and their cattle, and then they make ready for the journey, taking with them a month's supply for man and beast. On quitting this city they enter the Desert." For thirty days the Venetian journeyed through the shifting sand, and its horrors, both real and imaginary, are described in a highly vivid manner by him. From this time the "Desert of Lop" had a permanent place on the maps, but its precise locality was unknown. The Jesuits, on the strength of native information, were surprisingly near the truth in their map of Central Asia, subsequently published by D'Anville, in 1735, in Du Haldes' great work. For the first time Lop-Nor appeared as a basin without an outlet, into which the rivers of Yarkand, Kashgar and Karashar flowed, lying S.E. of Turfan, 109° E. of Ferro, and in 42⅔° N. latitude. A correction of its delineation was made by the Fathers D'Arocha, Espinha and Hallerstein, whom the Emperor Kien-Lung despatched to make a map of the enormous region subjugated by him as far as the Pamir and Ili. They based it on a number of astronomical positions, and compiled the remainder of the map from itineraries and existing Chinese maps.

About the same time many references to Lake Lop, and the historical importance of the adjoining regions were found in Chinese literature. De Guignes was the first to accumulate these in his History of the Huns. The Chinese had never been able to understand how so many streams could suddenly come to an end in the lake, and were persuaded that they must re-appear elsewhere. It was an old and almost hallowed supposition that the Yellow River rose in the Kuen Lun. But at the time that geography received an impulse in the time of the Han dynasty (207 B.C. —221 A.D.), people were unacquainted with these mountains and had not followed the Yellow River to its sources. When General Chang-kien, on the return of the expedition to the West, related how he had found the Kuen Lun south of *Yutien* (Khotan), it was immediately concluded, in spite of the audacity of the theory, that the waters flowing from thence into Lake Lop must dive into the earth and re-appear somewhere in the unexplored mountain region as the Yellow River. Later on the sources of the latter were found in Hsing-su-hai or the Sea of Stars, about 500 geographical miles from Lake Lop, and probably about 10,000 feet higher. The old theory still endured, however, and has survived to the present day in the Hsi-yu-ki, or Description of the Western lands, where it is stated that "east and south-east of Lop-Nor there is an innumerable number of springs which, seen from a height, resemble a sea of stars, and which are evidently a great river that flows underground. To the east are sand hills, and to the south-east is a steppe extending for 1000 *li*." The Yellow River, too, rises in a wide steppe basin where the great number of lakes has given it the name of Sea of Stars.

The results of the operations under Kien-Lung and all native geographical information were worked up by Klaproth, especially in his map of Central Asia, which appeared in 1830, and which formed the basis of Humboldt and Ritter's further researches. The first determined most shrewdly the probable height of several places, and assigned 2000 *toises* as that of Lop-Nor. Its geographical position was placed about 3° further west, and nearly 2° further south, than by D'Anville (*i.e.* 88⅓° E. of Greenwich and 40⅔° N. latitude at the point where the Tarim enters it). With few modifications this position was universally accepted by geographers, the position of the lake in the centre of an unapproachable region having effectually prevented any traveller from reaching it.

Slowly was the barrier broken through from the west. After that Russian explorers had begun in 1857 to investigate the Western Tian-Shan and its hydrography: Johnson in 1866 accomplished his important journey to Ilchi, the capital of Khotan. Hayward and Shaw soon followed with their visit to Kashgar, and other English travellers investigated the Tarim river system to the west and south-west. The entire basin of the stream proved to extend over a larger area than those of any other known stream. A wide semi-circle of mountains with ridges between 18,000 and 20,000 feet in height, and peaks attaining 25,000 and even 28,000 feet in height surrounded, it on three sides, while the intervening depression sloped from a height of 6000 feet at the edges to about 2000 feet above sea level at the lowest point in the centre.

This depression is part of an ancient sea into which flowed streams down the declivities encompassing it on the southern, western and northern sides. The winds blowing from every direction deposited their moisture on the outer sides of the surrounding ranges, and the streams formed thereby, breaking through the mountain ranges, converged into the old ocean bed. The more insignificant lost themselves in the sand, others flowed further and spread themselves over a flat, salt basin and were there absorbed; while the larger, reckoned at about sixty in number by the Chinese, united themselves in the Tarim, a river which in point of length ranks between the Rhine and Danube, but exceeds both in the massiveness of its surrounding mountains, just as it exceeds the Danube in the extent of its basin. Its tributaries created a number of oases along the feet of the mountains, which were fertilised by the drainage of the mountains, and played an important part in the history of these regions. The exploration of the more western of these from Kiria and Khotan to Kashgar lent additional interest to the lake wherein all the drainage converged. People learnt from native information of a place as well as a lake called Lop. But many points in the problem remained undetermined, and especially the position of the lake, although endeavours were made to fix its position from the various itineraries leading thereto from different directions. Shaw reckoned the lengths of the daily journeys too short and the sinuosities of the road as much too great, and so arrived at the conclusion that the lake lay in reality from 4½ to 5 degrees of longitude further west than it was placed on the maps. He reckoned the days (see *Proceedings R.G.S.* xvi., p. 243) at 20 miles, and deducted about one-third for sinuosities, bringing the net amount of ground covered *per diem* at 11⅓ geographical miles, whereas 21 geographical miles, and one-seventh for sinuosities (as the crow flies) is a truer allowance, making the distance per diem, 18 geographical miles. Yule reduced this westerly shifting to three degrees, while others hesitated to accept this removal at all in the face of the general accuracy of the Jesuit maps. The formation of the ground was another matter of uncertainty. The height above the sea of the lake was very probably about 2000 feet, but the surroundings were all involved in doubt. Until some months ago the opinion prevailed that the lake lay in a huge basin and was as far removed from the southern mountain range encompassing the basin as from the Tian-Shan. Without a sufficient regard for the Chinese accounts, all maps gave the diameter of the basin at about 330 geographical miles. A map reproduced on a reduced scale by Baron von Richthofen in his work on China, and compiled from Chinese information, shows the mountain mass south of Lop-Nor pretty correctly as extending up to beyond the 39th parallel, and reduces the breadth of the basin about the 88th meridian to about 100 geographical miles.

Prejevalsky had been attracted to the subject during his journey in Tsardam, when he had crossed a river, by following which, up stream, people would arrive at a country where there were wild camels, and could reach Lop-Nor without difficulty. His accomplishment of this journey belongs to one of the most important geographical feats of modern times. Taking his discoveries one by one the first one that claims notice is the *Little Yuldus plateau*. From Chinese maps and works it appears that the structure of the

Tien-Shan, in parallel chains running from W. by S. and E. by N., is broken by two plateaux running W.N.W. and E.S.E. and known as the Great and Little Yuldus. It was also known that the latter of the two lay on a formerly-frequented route, and that it was covered with luxuriant pasture. In the fifteenth century, the embassy which Shah Rukh, the son of Timur, sent to the Chinese Court, took their outward journey by way of the Yuldus which was described by the physician of the party. The Chinese often mention both plateaux, and inform us that Yuldus means "star." Prejevalsky confirms and completes former information and gives us a very lucid description of the tract. From the Kunges valley, which he ascended to the height of 4000 feet, he crossed over a pass 6000 feet high into the equally high Tsanma valley, which to the south was shut in by a quasi-Alpine range called Narat, over the pass of which he descended into the lower end of the Little Yuldus (7-8000 feet), which in consequence of the Dungan rebellion had been abandoned, although eleven years ago Turguts (11,000 *kibitkas* strong) had dwelt here. The Great and Little Yuldus are divided by a lofty range rising above the snow-line and running W.N.W. and E.S.E. On the north side the system of parallel ranges peculiar to the Tian-Shan appears to set in. A road leads hence to Urumtsi, and according to the Chinese map, appears to cross the Tangri-ula mountain chain by the Ulan-Sadak-dabaghan pass. Where Prejevalsky to the north found the Odonkure mountain, on the Chinese map, we find Odungkur-dabaghan. To the south also the inhabitants appear to recognise the existence of passes as the four names there given by Prejevalsky are coupled with the word *daban*. To the east, according to the Chinese map, two passes lead from the plateau, the Khabtchil-dabaghan or "Ravine pass" and the Dalan-dabaghan or "Seventy passes." The position and description of the first appear to correspond to the one Prejevalsky crossed, the height of which is given as 9300 feet. The ravine, 40 versts long, through which the Khabtsagai-ghol river runs, correspond probably to the Khabtchil-gool of the Chinese map. After this follows the ravine or valley, 22 versts long, of the Balgantai-ghol, and the traveller next came to the Khaidu-ghol at a height of 3400 feet. The mountain slopes on the south side are bereft of all vegetation, and a contrast to these on the north, suggesting to Prejevalsky's mind an idea of lifelessness.

The Kuruk-tagh Mountains.—Without visiting the town of Karashahr and the neighbouring large lake of Bostang-Nor (as it is called on the Chinese map—Prejevalsky calls it Bagarash) into which the Khaidu-ghol flows, the traveller turned southward and reached the not very high, arid, and sterile range called Kuruk-tagh. Hitherto it has appeared as Kurungle-tak on our maps, a name derived from Korla or Kurungle, a town on the south side thereof, which Prejevalsky visited. The Kaidu-ghool which leaves the lake a little above, breaks through the range in an extraordinarily narrow gorge, 10 versts long. The Chinese work descriptive of the western countries referred to above (probably compiled by Hsii-Sung in 1821) says: "The river flows for 100 *li* in a south-west direction, turns and flows south through the mountains, and for a short distance beyond it, after which it bends to the west. Here it passes the ancient coal mine opened by the Governor Yung-kung-kin in 1815. It flows then further westward and about half a *li* south of Khalgo-aman-kuentai." This is one of the forts described by Prejevalsky. The river now enters a narrow, dreary gorge, which is depicted in very gloomy and picturesque language by the Chinese author. This gorge which played an important part in the history of Chinese conquests bore for a time the name Tie-monn-kwan or pass of the Iron Gate. On the south side there stood a fort built of clay. Korla, visited by the travellers, lies, according to the Chinese accounts, 150 *li* south-west of Karashahr and has a population of 700 families, the people being described as lazy, slow, quarrelsome and uncultivated. Rice, wheat, grapes, melons, fruit, fish, crabs, wild geese, ducks, herons, &c., are mentioned as products.

These explorations throw light on the strategical value of the gorge in the Kuruk-tagh, and on an episode in Chinese history. Immediately north of Khalgha-aman, and probably to one side of Prejevalsky's route, we find on the Chinese map "Ruins of an old town," which, from other sources, we conclude must have been Ului-chong, which, at the time of the Han dynasty, was the seat of the Governor-General of Hsi-yue or East and West Turkestan. In the Han annals the distance of every place to the west is always given, reckoning from Ului as the most important place. We now see that its position enabled its ruler to afford protection to the caravans against the unruly tribes on the southern slope of the Tian-Shan.

3. *Character of the Desert.*—Along a southern slope of the Kuruk-tagh there extends a strip of ground between 20 and 25 versts in breadth, covered with flints and gravel. Prejevalsky considers it to be the shore of a former sea. Then follows the immense extent of the desert of the Tarim and Lop-Nor, which has a twofold character, being composed of a thin loam impregnated with salt on the west and shifting sand on east. On these points, however, Baron von Richthofen does not make any remarks. But with regard to the——

4. *River System*—he observes that the map south of Korla assumes a totally new aspect; only the great western bend of the Khaidu-ghol, which Prejevalsky here calls Konche-daria, having been previously known, and this being probably more important even than it is now made out. It does not, as shown on the Chinese maps, reach the Tarim about three-quarters of a degree south of Korla, but makes a bend eastward and then flows southward to join the complicated network of the Tarim. While Korla proves to be only 5 minutes further north and 8 minutes further west than hitherto supposed, Lop-Nor, contrary to Shaw's arguments, assumes a more south-easterly position.

5. *The Altyn-Tag Mountains.*—Baron von Richthofen remarks of the discovery that it is one of the greatest importance, both for geography and for the history of Central Asian intercourse. Now one can understand why the old silk traders in their route to the western countries journeyed so close to the south of Lop-Nor, although here lay the dreaded deserts between Sha-chow and the lake; for to the south the road was blocked by mountains. It is clear a road lay in that direction as well, but it was but little

used, probably on account of its great difficulties. Armies and caravans always journeyed through the Lin-lan or Shan-shen kingdom, which lay on the south bank of the lake. Other points in ancient history are cleared up by the same means. At the time that the Chinese, under the Han dynasty, were first directing their gaze to the west, Shang-kien on his return in 127 B.C. from his remarkable expedition to Ferghana and the lands about the Oxus, found the whole country, as far as the Salt Lake or Lop-Nor, in the hands of the Hiungnu, whose possessions extended as well over wide tracts in Mongolia. He therefore endeavoured, on his return, to make a way through the country, which, to the south joins the Tibetan country of Kiang, in order not to fall into the hands of the Hiungnu. Shortly after, in 121 and 119 B.C., Chinese troops, under the young leader Ho-kin-ping, penetrated for the first time into the regions to the west, and found the right wing of the Hiungnu settled on the Salt Lake and the Ping-nan mountains, (*i.e.* the mountainous region south of the plain). This statement was incomprehensible as long as extensive plains were believed to lie south of the lake, whereas now it is clear that they could have complete control and oppose the movements of caravans and armies between the east and west.

6. *Lop-Nor.*—It is remarkable that Prejevalsky found the lake much further south than the Chinese accounts and maps made it out to be, and that the water proved to be fresh instead of salt. The first lake, Karabunan, appears to be merely a preliminary fresh water basin, the water of which only undergoes any change in summer through evaporation. But the statement that the water in the second basin, which corresponds to the true Lop-Nor, is fresh, is, Von Richthofen points out, most surprising. The region through which the Tarim flows is highly charged with salt, the saltish water borne down must have been subjected for centuries past to a high evaporation, and the Chinese during all time have called Lop-Nor *the* Salt Lake, *par excellence*. Richthofen suggests as possible explanations, that the river bed, like that of the Po and Hoang Ho, being upraised above the level of the surrounding country, has consequently diverged from its eastern course, as shown hitherto on our maps, and that the two lakes at its mouth are of recent origin, the older one to the north-east having dried up in the course of time. A third and likelier explanation suggested by Von Richthofen is that besides the two lakes seen by Prejevalsky there remains a third lake communicating with the Tarim by means of an arm. He observes that a wide experience of Chinese maps has convinced him that though they are characterized by a paucity of detail nothing is ever laid down thereon that does not actually exist. (Would that Europeans had arrived at the same perfection of geographical science!) From the place of confluence of the Ugen-daria and Tarim as given by Prejevalsky on his map, taking it with reference to its distance from Korla on the Chinese map, a road (apparently identical with the one followed by Prejevalsky) leads in a southerly direction. The same map shows no indication of a road running on the *eastern* side of the river (as Prejevalsky's does), and makes the latter flow almost due east into a large lake, apparently not seen by Prejevalsky, and cut into two unequal parts by the forty-first parallel of latitude. This lake is called on the Chinese map Lop-tchor or Lop-Nor, and about it lie seven small lakes, the northern of which are called *tsan-hu* (grass or reed lake), and the southern by various names. The map also shows further to the south-east and wholly unconnected with the Tarim, another lake called Khas-omo, the centre of which lies about 3 degrees east and 1½ degree south of Korla, only a little way from the place where Prejevalsky places the Kara-kochun. On the same map there is a second lake without a name westward of the Kara-kochun, but it is not to be found on older maps. Koshun is, etymologically considered, not unlike Khas. Khas-omo is Mongolian, and means Nephrite-lake, probably referring either to the colour of the waters or to the fact of the nephrite trade route lying in that direction. The Turks say *Kash* instead of *Khas*, and *Kara-Kash* is the name for the common sort of nephrite, so that Kara-koshun (black Koshun) might well be derived from the Mongolian Khas. The Chinese also called the district Kara-Huo-tchou, which they pronounce Kara-khocho.

Baron von Richthofen's conclusion, therefore, is that the Tarim formerly had only one bed, and that lay to the east towards the true Lop-Nor, but that later on a branch diverged to the south-east from the place where the Ugen-daria now joins it, and that this, flowing into the Khas lake, became the principal stream, and the Khas lake the chief reservoir.

The following arguments point to the same conclusion :—

(*a*) The Chinese maps represent plains south of Lop-Nor, but mountains south of the Khas lake, and these, with reference to the positions of Prejevalsky's lake and of Korla, occupy the same place that the Altyn-Tag mountains do.

(*b*) South of Lake Khas they show the road eastward to Sha-chow and another road leading southward to Tibet just as Prejevalsky does.

(*c*) Prejevalsky found that the name of Lop-Nor, which according to the information collected by Shaw, Forsyth and others is well known far and wide, was not applied by the natives to the two lakes he discovered, which leads one to imagine that he took the wrong direction, *i.e.*, one west of the true Lop-Nor.

(*d*) The combination of historical data regarding the former trade-route from China to the West points tolerably clearly to the conclusion that the region of the true Lop-Nor was not touched by it, and that it led to the south and west of Khas-omo, so that there, and not by Lop, must the kingdoms of Lin-lan, Shan-shen, &c., have been situated, which, in the course of history, were described as in the neighbourhood of the "Salt Lake."

(*e*) A last argument is based on the mass of water borne by each stream, and this shows that the river, when joined by all its tributaries, is considerably smaller, apparently less than half the aggregate of the different streams. As Prejevalsky travelled between the two arms, it is possible that the eastern arm sends a portion of its waters through a channel unseen by him into a basin to which the name Lop-Nor more rightly belongs.

It is therefore probable that Prejevalsky has not completely solved the problem of Lop-Nor.

(To be continued.)

ABYSSINIA.*

THE highlands of Abyssinia form a series of terrace-shaped plateaux between six and nine thousand feet above sea level, which on the one side are over-topped by lofty ranges and isolated conical peaks, and on the other side are seamed by numerous ravines caused by the drainage of ages. In their lower course these ravines become narrow valleys exposed to a tropical sun and shut out from the healthy action of the breezes, and so breed miasmatic influences which deter settlers. The higher valleys and table-lands, on the other hand, enjoy a much healthier atmosphere and more equable climate, and are studded with villages and hamlets shaded with clumps of trees and perched, now on an eminence and, now, nest-wise, on the extreme edge of a perpendicular cliff. The rainy season usually lasts from the middle of June to the middle of September, and agreeably tempers the heat which at the height of 6000 feet seldom falls below 18° or rises above 32° Centigrade. At a higher elevation thin ice is not unfrequent at night, but snow is quite unknown, although the loftiest peak of the Semien mountains (upwards of 15,000 feet high) is for a brief season covered with encrusted hailstones, and ice is to be found in clefts on its northern side for ten or eleven months in the year.

The geological structure of the country is not complicated, the base being uniformly granite, while the overlying metamorphic slate is frequently broken through by eruptive masses of porphyry, trachyte and less often greenstone, close to which eruptions, quartzite and other veins indicate the probable mineral wealth of the country. Coal measures crop out in the Chelga district to the west of Gondar, on the Sassela river, north-east of Sokoto, and to an important extent along the eastern boundary of Shoa. Abyssinia has no volcanoes, though earthquakes are not unfrequent and numerous hot mineral springs give evidence of volcanic activity.

The varying heights are characterised by a corresponding variety in the fauna and flora, and, in a comparatively limited expanse, Abyssinia can boast of all the products of the three zones. In the lowlands of Kolla, cotton, indigo, ginger, and tea grow wild, while the table-lands grow cereals and other European products. In timber the country is very poor, and though the remains of juniper and olive woods are to be seen on the mountains, it is only in the ravines and valleys that any abundance of timber is to be found. Hyænas, jackals, hares, water-fowl and partridges are tolerably abundant on the highlands and common on the lower levels.

The population of Abyssinia, including the Galla tribes of Shoa, according to an enumeration made by King Theodore in 1860, amounts to twelve millions, consisting mainly of Christians, Muhammadans and Pagans—these last among the Gallas and Shangalas to the south and west. Besides these there are a few Jews in Amhara. The principal language is the Amhariña, which is derived from Göez, a tongue having a near kinship with Arab and Hebrew. About the countries to the south and south-west but little can be ascertained from the traders. The trade route goes from Baso, on the Blue Nile, to Guderu, which is tributary to Gojam and, further on, to Chima and En Narea, where a great Sultan rules and the people speak the Galla dialect, and thence to Kaffa, which is the mart, or rather limit. This country is inhabited by Christians, is governed by a King, and gold there is not much dearer than silver. The Abyssinian towns usually have markets which are held once a week in the suburbs. At least one church is to be found in each city even when the inhabitants are mostly Muhammadans. There are but few towns of any commercial importance, and these are generally frontier towns or towns where two or three routes converge. Sokoto, the capital of the province of Lasta, is the most important, and is situated at the point where several routes meet, viz, those to the north to the coast, to the salt-mines of Arrho to the east, to the south towards the eastern Gallas and Shoa, and lastly to the west towards Amhara and Gojam. Baso is the principal mart of Gojam, Gondar, which has 44 churches and 12,000 permanent inhabitants, of the Amhara country, and Adua, with its 4000 inhabitants, of the Tigree country. This last town is on the route from Gondar and Sokoto to Massowah and is of importance to European traders.

The Abyssinians are naturally given to agriculture and have been so since the earliest times, but, notwithstanding that, only about four per cent. of the culturable land is actually under culture. Any one can clear a plot of waste land and proceed to plough it up, and this constitutes an irrevocable title thereto. Their wooden ploughs are of the most primitive construction, and are driven solely by oxen. The harvest is a slow business, and it usually takes from eight to ten reapers three days to reap a field of half a hectare. The threshing or process of treading out the corn by oxen and cows is equally tedious. Manuring is quite unheard of, as the droppings are dried and used for fuel. Irrigation can be very easily resorted to in the uplands, and three harvests in the year can by this means be secured, but the natives lack the knowledge and experience to put it into practice. Cattle are tolerably plentiful, as the waste tracts afford more pasturage than enough; goats are only to be found in the lowlands and sheep in the uplands. Horses are mostly to be found among the Amhara and Galla inhabitants, while mules are bred in pretty good numbers in Hamazen, Lasta, and Gojam. The wheat principally grown is the *Poa Abyssinica*, which is cultivated throughout the whole of Abyssinia and in the southern Galla country. It gives a light digestible bread, which forms the chief subsistence of the people. Barley and leguminous plants are largely cultivated, and bear a dry heat well. Peas and beans, pounded and cooked, form the holiday food. Potatoes were introduced by the Naturalist, Dr. Schimper, and flourish excellently, but their cultivation is nevertheless neglected by the natives. Cotton (*Gossypium arboreum*) is confined to a few low-lying districts in Wolkait and Yedshu; and coffee is grown chiefly in Western Galla and Shoa. Tobacco is cultivated everywhere, but sparingly; indigo is found wild in large quantities and exuberance at Barezza, not far from Massowah, and valuable timber trees and several species of fruit

* By Herr Camill Russ, a traveller well acquainted with the customs and languages of Abyssinia and the Galla country, and who proposes, if possible, to renew further attempts of his to follow the caravan route from Enarea and Kaffa and to reach the coast to the south-east. (*From the Geographische Blätter of the Bremen Geographical Society.*)

trees abound in the valleys; sugar and rice only need to be introduced to flourish.

Commerce is unimportant compared with the size, population, and productiveness of the country. The rivers are numerous but not navigable, while during the rains they are swollen to torrents, and the bleak mountains and deeply-cut valleys make travelling a difficult and tardy matter, bridges and roads being unknown. All goods are carried either on the shoulders or on a beast of burden—asses and mules more rarely—horses being generally used. Camels cannot be employed, owing to the stony ground. The exports consist chiefly of ivory, coffee, gold from the Galla country, raw and prepared hides and skins, and wax; the northern provinces towards Massowah yield butter and honey in small quantities. Until recently the slave trade with the Galla country was extensive, and the route thereof lay between Baso, the mart, Matamma and the Sudan; but now, although the Abyssinians own many Galla slaves, a slave cannot be sold for a third of its former price. Horses are brought in large numbers to the Sudan; mules are seldom taken further than Massowah. For safety sake the merchants travel in caravans. The traders from the Galla country bring their goods generally to Baso, and exchange them for European articles; at other times they take them *viâ* Gondar and Sokoto to Massowah, or by way of Matamma into the Sudan. The caravans from Shoa often come to Sokoto and even to Massowah. Besides the difficulty of the roads, the frequent stoppages for tolls form a great obstruction to trade, and the traders are furthermore compelled to submit to the will of the toll collector who squeezes the merchants as much as he can. Under these circumstances a caravan considers itself lucky if it accomplishes the journey from Gojam to the coast and back, a distance of under 500 miles, within the year. The European goods imported comprise chiefly calicoes, cottons, light silks and silky stuffs, wine flasks called *berille*, red morocco leather for saddles, snuff, incense, and spices, which last three items are exclusively in the hands of the Banyas. Raw cotton is mostly exchanged for coffee in Matamma. The trade in salt is of some importance. The mineral is found on the surface in the plain of Arrho east of Enderta and south of Zulla. The Taltals, who monopolise the trade more and more, bring the salt to Sokoto where it gets dispersed in various directions. The north-eastern provinces use salt from the coast.

The only current coin is the Maria Theresa dollar; and the diadem and the clasp on the shoulder must be clear in the impression, or else it will not pass. In the Amhara country bars of salt about 8 inches long are used as a lower currency, and their value varies with the distance they have travelled. In Tigree long hanks of coarse cotton, two of which go to the dollar, are used; wheat is also a pretty general medium of exchange.

The measure of length used is the length of the arm from the elbow to the tips of the fingers. This method of reckoning leads to occasional disputes, as some buyers are in the habit of bringing a long friend with them to measure their purchases by.

A useful table of prices current at Adua, Sokoto, Gondar and Baso, is given in Herr Russ's paper, showing the usual money value of such products as barley, butter, honey, coffee, sheep, cows, horses, hides and gold.

In northern Tigree cultivation is but slight and the land suffers much from drought and locusts. In the Amhara country the soil is more productive, the rainy season lasts longer and locusts are unknown. The want of roads brings other evils with it, for in event of a war or drought the deficit cannot be made good by neighbouring countries. Northern Tigree and Adua are now in this condition in consequence of the war with Egypt, followed by a scanty rainfall.

Cotton spinning is the work of women, and yarn for clothing many millions of men is spun by them. Weaving is a subordinate employment practised by the Muhammadans, who also follow commerce and agriculture. A coarse, but smooth and soft stuff is prepared by them which serves for clothing in most parts and for currency in Tigree. A rough, dark fabric is woven out of sheep's wool and serves for tents and clothing in the colder regions.

Iron ore of good quality is found pretty well everywhere on the surface, but the process of smelting is so rude and slow that a ploughshare of about 3½ pounds (?) weight costs a dollar. Other metals are found but not worked. The Abyssinians have an extraordinary idea regarding gold—that in the portion of ground on which the moon shines at night gold will be found in nuggets by digging. Pottery is a trade belonging chiefly to the Jews. Tanning is pretty flourishing, especially in the Amhara country, though the leather is but an indifferent article.

The mode of life is exceedingly simple, comforts and luxury being unknown to the Abyssinians. Within an enclosure of loose stones and thorns the peasant builds a rude, windowless hut of selected stones, smearing the interstices with dung: a conical-shaped roof of reeds and grass gives shelter from the rain and sun. Within are to be seen baskets for storing grain, jars and gourd flasks. A place raised from the ground and covered with a cow-hide serves as sleeping quarters for the whole family. On the wall opposite the entrance are two goat's horns driven into the wall, from which hang lances, a shield and not unfrequently a matchlock. One or two hives are to be seen in a niche with an opening in the wall of the hut to allow the bees free egress. In cold weather a fire is lit in the middle of the hut and the smoke fills the hut, escaping by the low entrance and by any crevice it can discover. The peasant's fields are often situated at a distance in some unhealthy valley, whither he must needs repair to protect the crops against elephants, buffaloes and antelopes, who occasionally make a sort of playground of the cultivated fields. The peasants are also subject to ruinous raids from soldiers, who do not scruple to levy black mail, though in the immediate vicinity of towns greater security is enjoyed. Here the land is better cultivated, the fields are richer and the dwellings better in every way. With regard to food, the wealthier people eat meat, but the poorer eat only bread and onions; pepper is largely used with most food. Abyssinians are fond of drinks, but the general poverty makes drunkenness rare.

It cannot be denied that the Abyssinians are progressing, and this may be ascribed partly to intercourse with the coast, and partly to the indefatigable efforts of missionaries. The number of priests and monks

is very large, and a third of the imposts is reserved for their maintenance. The head of the Abyssinian-Coptic church is the Abuna or Bishop, who must be a Copt, and under him is the Prelate of the monastic orders. There are but few monasteries or monastic villages in the country, and their inmates travel about as mendicant friars. The churches are numerous, and are situated for the most part on mountains and hills in a wood or clump of olive trees (*Olea chrysophylla*). The priests are obliged to marry while the monks are enjoined celibacy. The least number of priests in a church is seven, but in most churches there are many more. In the five churches at Adua the population is 3000 souls, and the number of church officials, &c., is no less than 1300. During the year there are constant holidays (about 200 in all) on which no work is done, and which contribute very much to the poverty of the land. The taxes are always farmed out, and the chief tax farmer has his seat in Gondar, with subordinate officers in Adua, Sokoto and Baso. Excluding the salt taxes in Sokoto the ruler draws as farm rent for all taxes the sum of 26,000 dollars per annum. There is no regular army, but the people are all very warlike, and in times of peace act as policemen, messengers and other functionaries.

Abyssinia is ruled by a king called Negusse Negest, *i.e.*, king of kings, and the different provinces are under governors. Negus Johannes, formerly a provincial governor, ascended the throne in 1875, and the same year the Egyptian troops invaded the country chiefly under the pretext that they feared an invasion of the Bogos country on the part of the Abyssinians, and were therefore compelled to occupy the province of Hamaze. This led to the war with Egypt, which trouble has since been followed by the attacks of Negus Menelek of Shoa. At the end of May last, Negus Johannes who has now but little influence in Amhara and Tigree and who relies mainly on the priesthood, was waiting in Shoa to punish Negus Menelek for his attacks on the Amhara country. Northern Abyssinia was being afflicted by a severe famine.

A NEW SURVEY OF THE AMAZON

WE learn from the *New York Herald* that the United States' corvette 'Enterprise' arrived off Para on the evening of the 24th of last May, with all on board well. The 'Enterprise' has been detailed by the U.S. Navy Department to survey the Amazon as far as Manaos, and the Madeira as far as San Antonio, the point of departure of the line of railway around the falls of the Madeira. She is to make a track chart of both these rivers, to determine latitudes and longitudes along their banks, to find shoals, rapids, and bars, and to generally so map and plot these comparatively unknown streams that they will be safe for future navigation by vessels engaged in commercial pursuits.

This will be a long and tedious operation, and, therefore, the 'Enterprise' has been selected, for she has greater storing capacity than the smaller craft used on our own coast for surveying purposes. She is 185 feet long, 35 feet beam, and draws 16·2 feet of of water; consequently, wherever she can go, any ordinary ship of the merchant marine can follow. The 'Enterprise' is no novice at river surveying. During December of last year and the three months following of this she was engaged on the river front of New Orleans. Although at work but a short time her officers accomplished the task given them, which was to ascertain the profile of the river from Carrolton to Jackson Barracks, a distance of over 10 miles, and necessitating thousands of careful shore and channel soundings. Having thus made herself familiar with one great river it is perhaps fitting that she should be selected to first make the acquaintance of its great rival—the mighty Amazonas. Her former labours and her quick traverse of the ocean between Norfolk and Para prove her a rapid steamer, averaging 9 knots on an expenditure of nine tons of coal per diem. She steers as beautifully as a pilot boat; her compound engines are most prompt in their action, and, generally, she is much more vivacious in her movements than a vessel of her size is expected to be. Her quarters are slightly cramped, it is true, but the glory that awaits her officers and the prvileges promised her crew are sufficient, it is to be hoped, to enable them to bear with equanimity the few months of heat, mosquitoes and lack of breathing room.

The Amazon survey will be under the command of Commander Thomas O. Selfridge, United States' Navy, well known to the department and the scientific world from his elaborate surveys of the route for the Inter-oceanic Canal, projected across the Isthmus of Darien. Commander Selfridge has passed through several seasons of hard tropical labour, and is as thoroughly acclimated as one can be who is not to the manner born. He brings to the Madeira work, therefore, not only a wide experience and a strong physique, but also—if the future can be judged by the past—an indomitable energy, that will not quail before anything but the invincible powers of nature.

He will be assisted by the following staff:—

Lieutenant-Commander S. H. Baker, United States' Navy.
Lieutenant F. W. Nichols, United States' Navy.
Lieutenant G. Blocklinger, United States' Navy.
Lieutenant C. P. Perkins, United States' Navy.
Lieutenant L. G. Spalding, United States' Navy.
Master M. F. Wright, United States' Navy.
Paymaster G. H. Griffing.
Passed Assistant-Engineer, W. A. Mintzer, United States' Navy.
Passed Assistant-Surgeon M. L. Ruth, United States' Navy.
Draughtsman Q. W. Sparrow, United States' Navy.
Ensign D. Peacock, United States' Navy.
Ensign H. J. Hunt, United States' Navy.

All of these officers are experts in river work or are eager to become so. Several of them are accomplished stellar observers, a speciality that will be particularly useful in determining latitudes and longitudes on the rivers. Thus with a good ship finely equipped, a skilful commander, educated officers, and a well-disciplined, healthy and young crew, there is every reason to believe that the survey will be carried to a successful termination, rapidly, thoroughly, and it is also hoped, without disaster.

It would be imagined that the Amazon, draining as it does millions of acres of richly-wooded and immensely-fertile territory would have been long ere this carefully surveyed, properly buoyed, and thoroughly lighted. This, unfortunately is not the case. The Amazon to-day is almost as much of a mystery as it was when Orellana, the faithless lieutenant of Pizarro, picked his lonely way down to the great

ocean. A river that should be as well known as the Hudson or the Delaware, whose currents, shoals, channels and islands should be as plainly located as are those of the Mississippi, is a fluvial highway whose many dangers are known only to a few Indian or Portuguese pilots. The longitude of its principal city is not yet accurately determined; its channels and shoals are not even marked on the best Brazilian charts that can be obtained. Steam craft, it is true, ply on the river from Para to Tabatinga, but these are intrusted to Indians, who rely more on the light draught of the vessels than they do on their own knowledge of the stream. The reason of this utter neglect of what should be the source of revenue to the Brazilian Government is found in the general apathy of the people, the poverty-stricken condition of the Brazilian Treasury, and the incomprehensible stupidity of the decree which, until lately, kept foreign flags from trading on the Amazonas.

A great stream that should be populated from its source to its mouth, whose banks should be studded with villages, towns, and cities, is, from these causes, almost deserted. It flows at times for hundreds of miles without passing a human habitation; or if here and there, along this desolate stretch, smoke arises to show that human beings are sheltered beneath the roof of the rude hut that barely shows itself amid the tropical green, it will come from the fire of a half savage, or the embers of a runaway slave who has hidden himself in the fastnesses of the forest, away from his enemy, the white man. Attempts have been made to settle the river, but the Jesuits, indefatigable as they were, failed; and the people of the south, who at the close of the war came to Santarem, followed their example. It remains to-day, as it has been for ages, silent and mysterious, its banks unfrequented, and its waters unknown. No well-organised effort has ever been made to properly survey either the great river or its principal affluents. What has been done was in reality accomplished by the English explorers, Maw, Smyth, Wallace, Spruce, and Bates; by the Americans, Herndon and Gibbon; by Admiral Tucker, for the Peruvians; by the German Keller; the English engineers Sidstone and Browne; and by the late Professor Orton, whose body lies high up in Peru, and whose grave, on a quiet island in the clear lake of Titicaca, overlooks one of the sources of the river he loved so well. These gallant men, in canoe and launch, have sailed and paddled from the head-waters of the Amazon to its gigantic mouth. They have wandered up its tributaries and have traced out its feeders, but they, despite their willingness could not accomplish the impossible (to them) task of mapping out majestic rivers for commercial purposes. For this a great incentive was needed, and this incentive has at last presented itself.

A safe pathway for merchant vessels drawing over twelve feet of water is imperatively demanded. The cause of this sudden demand for practical working charts of the Amazon, and particularly of the Madeira, is the prospect which is most fair, of the speedy completion of the Madeira and Mamore Railway. The history of this railway, which now, after years of costly litigation and endless Chancery suits, has at last fallen into energetic American hands, has already been given in the *Herald*. It will suffice to say that the former contractors, not having fulfilled their promises, have been entirely withdrawn, and that the construction contract has been awarded to the Messrs. Collins Brothers, of Philadelphia, who have guaranteed to build the road in three years. This railway, if successfully completed, will surround the falls of the Madeira and give an outlet to the products of the fertile valleys of Bolivia. The scheme seems to be one of such unbounded promise that it is strange it has not already been realised.

Ernest Morris, the youthful explorer, who returned from Brazil about a month ago, having explored the region of the Lower Amazon, is about to set out under more favourable conditions to continue his work in Brazil and also to explore some of the comparatively unknown regions of Bolivia. He goes out as Naturalist to the expedition organized by Messrs. Mackie and Scott, of Philadelphia. The object of the expedition is to arrange a route by way of the large rivers which connect Bolivia and Brazil over which trade can be carried on. As a preliminary measure a surveying party will go to Bolivia to study the country. It is composed as follows: Mr. Mackie, chief; Jas. W. Gorham, assistant; G. P. Lockwood, mineralogist; G. W. Keasby, geographer; J. C. Pennington, M.D., surgeon; R. Hope Hepburn, chief of transportation; John Robb, secretary; Ernest Morris, naturalist; C. S. Mackie, volunteer aide; F. W. Berry, quartermaster. The party will also be accompanied by Messrs. Lawford, Moray and Hunt, with the necessary native assistance. It is intended to place steamers on the Lower Amazon, the Lower Madeira, and also on the Madeira above the falls, and thus open a route to Northern and Western Bolivia. Hitherto the bulk of the American goods sent to Bolivia has been landed on the coast of Peru, and carried by mules over the mountain ranges. In this way it took 180 days for goods to reach their destination, while the freight averaged $55 per ton. By the new route it is expected that the time will be reduced to thirty days from New York, and the cost of transportation to $15 per ton. The plan is to carry freight up the Amazon to near Barra, where the Madeira joins the Amazon. It will then be taken in steamers up the Medeira, as far as the rapids. It will be carried in railway cars past the rapids, and will then be transhipped to other steamers, which will carry it to its destination. The railway along the rapids is now building, and when it is completed a direct highway to Bolivia will be opened, by which the necessity of carrying merchandise around Cape Horn and up the Pacific coast will be obviated.

Several members of the surveying party have already left for South America. The others will sail shortly, and the party will meet at San Antonio, near the first rapid of the Madeira, about the middle of August. They will proceed with boats and Indian guides over the falls, making a scientific survey of the Rio Mayutata, Rio Beni, Rio Mamore, Itenez or Guapore and other rivers. Above the rapids of the Madeira it is estimated that there are 1800 miles of navigable water. The party will take a number of steam launches in sections with them. Their head-quarters will be at Cochabamba, a town near the centre of Bolivia, and surveys will be made in several districts by divisions of the party. Rubber, Peruvian bark, gums and dyes

are at present the chief articles of export from Bolivia. Gold, silver and copper abound in the mountainous regions.

Mr. Ernest Morris, who accompanies the party as Naturalist and Correspondent of *The World*, will be absent about two years. He has already made three trips to Brazil. His first trip was devoted to an exploration of the lower part of the Amazon, and he was absent fourteen months. On his second trip he went as far as the head-waters of the Tapayos, and his third journey was up the Amazon.

INDIAN IRRIGATION.

THE *Times* of the 5th inst. places this subject before us in a light that is not visible to those who are now advocating an increase of irrigation works as a sure remedy against the anticipated ruin of future famines. We are supplied with figures giving the actual expenses of certain works. If these figures are right they expose a melancholy failure of the works in a mercantile view, while their political and social economy is carefully kept out of sight. If you will allow of a few words on these points, the subject may be more intelligible to those who undertake to guide the public into their own theories without seeing their workings and results.

"The report on irrigation in Guzerat and the part of the Deccan in the Bombay Presidency for 1876-7 shows that out of twenty-two works fourteen are entirely new. The total capital outlay up to April 1876 was 10,804,333 Rs.; the assessments during 1876-7, 136,645 Rs., the working expenses 101,894, leaving the surplus of assessments over working expenses at 34,751, and giving a net return of ½ per cent. on the capital outlay. The area irrigated is 13,762 acres." It may be pointed out in passing that the 34,751 Rs. do not make ½ per cent. on the capital, and it is not said whether that sum was actually collected. Taking the figures as they stand, the capital cost may be put down at 785 Rs. per acre, and the assessment on the capital is more than 94 Rs., the working expenses are more than 7 Rs. per acre, so that we only realise about 2 Rs. per acre, or 27,524, in lieu of 34,751 as the amount for collection. This is as near as possible only ¼ per cent. on the capital outlay. Under either condition the works are failures in a mercantile view, but the figures before us do not point out that the area irrigated by these twenty-two works would have given a revenue of at least 1 R. per acre without a farthing of outlay. The real profit is therefore the difference between a wet and dry cultivation: by the figures in the *Times* this comes to 20,989, by the other calculation to 1 R. per acre on 13,762 Rs. as the actual profit to the treasury. The dry collections might have been much more than this, as dry lands near large towns are assessed up to 3 and 4 Rs. per acre. The actual loss to the treasury may therefore be much greater than here shown.

The political and social economy is rather more enigmatical. The assessment on food-producing land may be put down at 1 R. an acre. The assessment on irrigated land is seldom under 5; in the case before us it is over 9 Rs., but no ordinary food is ever grown on these wet lands. Rice is grown on land with a natural irrigation; superior sorts may be grown on artificially irrigated areas, but the price of this grain is beyond the reach of the poorer classes. It follows that every acre of irrigated land, under the works alluded to, takes away from the food production. The value of the produce being greater more money is realised, but by the time the assessment is paid the cultivator is scarcely better off than his dry neighbour. It is allowed that any excess of profit enables a farmer to buy more food, but in seasons of scarcity that cannot now be bought on the spot. Formerly the cultivators kept a store of food, the roads were bad, and transit duties were levied on all grain; these duties were taken off in 1836, the roads are improved, and railways carry off the produce of the country. This produce is that which sells elsewhere, not the ordinary food. The area for this has been growing less and less, while the consumers are increasing. The price of food is therefore much higher than it was, but the price of labour has not increased, the supply is above the demand; our social economy is therefore at fault, and we are doomed to perpetual famines in some parts of our Indian Empire. It must be recollected that our rivers, tanks, and wells depend upon the rainfall; if that is plentiful all goes right, if it is deficient the entire water supply follows suit, and the irrigated land may be in a worse predicament than the dry. It is only near the estuaries of the larger rivers that the supply of water may be considered safe: in 1876-7 the Godavery supply nearly failed with one year's drought. I have known the sources of this great river quite dry, but its lower channels drain several basins, and water percolates beneath its sandy beds. The question may now be asked, is our political economy right? Are we improving the condition of the ruled or the rulers by our great works on irrigation? and do we in any way avert famines by decreasing the area of food production? Any one asserting that we do meet times of scarcity, or that we do cheapen food by these works, must place before the British public statistics to prove it; the figures here referred to prove the contrary; but when the irrigating advocates get the influence of Mr. Bright into their scales, it seems almost natural that they should outweigh the evidence of facts.

H. P. MALET.

IRRIGATION IN MONGHYR.

AN interesting little work by Mr. Edward Lockwood, of the Bengal Civil Service, has just been published by Messrs. Allen. Mr. Lockwood was formerly Magistrate of Monghyr in Bengal, and his book gives a lively and interesting account of that district, especially of its natural history. Mr. Lockwood is of opinion that it is idle to talk of irrigation as a permanent preventive of famine. All it can do in Monghyr is to increase a pauper population up to a certain limit by producing more food than is produced at present; but irrigation cannot possibly increase food as population increases, in geometrical ratio. It very rarely happens that water, other than what the clouds supply, is required for the principal rice crop, and as the holdings generally are very small, the tenants can sink wells, and irrigate their scanty crops from them, or from tanks which can be made without cost during leisure hours.

The Government has already made extensive irrigation works at Kharakpur, about 15 miles from Monghyr, and will thus be able to form a fair estimate how far irrigation on a large scale is likely to succeed and ward off famine in this district.

HIGHWAYS AND BYEWAYS OF NAVAL HISTORY.

IV.

SIR RICHARD GRENVILE AND THE 'REVENGE.'

(For the previous articles by our valued contributor, Robert Lendall, see our numbers for November and December, 1873, and January, 1874.)

THE Poet Laureate, in the March number of the *Nineteenth Century*, brought into a prominence which it might never have otherwise had, a byeway of Naval History, causing us to retrace our steps 287 years for the purpose of travelling over the path with him.

Those who have read his stirring poem, of which the very ruggedness has an illustrative meaning in view of the hero's character, will see at once that the poet has been to contemporary records for his subject. But those who, as simple historians, go to the same records, may perhaps observe that the Laureate has given a dash of fine colour to the character of his central figure, which in the original pictures it wants.

These pictures have been painted in the firm outlines, and the broad masses of contrasted light and shade, which distinguish the old masters of narration from their later disciples. Not to go, in a short article like the present, to more recondite sources, we may take the narratives of Sir Walter Raleigh; of John Huighten van Linschotten, a Dutchman; and of Sir William Monson, as giving us not all the facts. but enough to produce, however clumsily, a picture in prose, as a companion to that already drawn in verse.

Sir Walter Raleigh's account is remarkable as being his first published literary effort. As printed in Hakluyt it is entitled, *A Report of the Trueth of the Fight about the Iles of Açores, the last of August* 1591, *betwixt the 'Reuenge,' one of her Maiesties Shippes and an Armada of the King of Spaine: penned by the honourable Sir Water Ralegh, Knight.* Sir Walter was a kinsman of Sir Richard Grenvile. The two had been joint promoters of the Virginian expedition of 1584, and Sir Richard had himself commanded the expedition which followed next year. It was on all grounds fitting that Raleigh should be the public defender of Sir Richard Grenvile from the calumnious reports spread by bombastic Spaniards all over Europe. It was, as Sir Walter put it, "agreeable with all good reason for manifestation of the truth, to overcome falsehood and untruth; that the beginning, continuance, and success of this late honourable encounter of Sir Richard Grenvile, and other of her Majesty's Captains with the Armada of Spain, should be truly set down and published without partiality or false imaginations."

But while we may well take Raleigh as our leading authority in drawing out the story, we must not forget that he necessarily wrote as an advocate, and as an advocate with a natural bias towards Grenvile. On the other hand, he wrote his account from the depositions of seamen who had fought in the 'Revenge,' and he confirmed or checked their accounts by that of a Spanish captain who had been present at the fight, and who was, when Raleigh wrote, a prisoner in London. Our friend the Hollander wrote as one nearly an eye-witness of the fight. He was at Terceira at the time, not 200 miles off, and met immediately afterwards, both Spaniards and Englishmen who furnished him with the details of the encounter, and with that bye-gossip, which, growing as it passes from mouth to mouth, after an exciting incident, ultimately takes form and shape as tradition, which it is impossible to separate from true history. Van Linschotten had that sense of the ridiculous in the midst of the most stirring dangers which characterised the "Adventurer" of the time, and which, strong amongst the English, made the "Morris dance on the waves" seem such an appropriate title wherewith to denote the defeat of the great Armada. Coming to the Azores apparently as a merchant adventurer, and not sure in the unsettled state of things whether he was a Dutchman and an ally, or a Spaniard and an enemy of Englishmen, he is hopeful of business in either case. But under no circumstances could he avoid seeing the fun of the thing when, being chased by three English ships, his crew took an hour to recharge and shoot off their piece of ordnance, and made so great a noisy fuss over it that the Englishmen drew near on purpose to jeer at them. But unless this worthy narrator had a prejudice in favour of the humorous side of things so great as to mislead him, there is no reason for us to doubt but that what he heard he set down.

The last of the three who tell the story is Sir William Monson. At the time of the fight he was a prisoner of war at Lisbon, and had been Flag-Captain to the Earl of Cumberland in the 'Garland' on the coast of Spain, immediately before his capture. This contemporary writer, one of the band of purely "Naval" officers who made the age of Elizabeth so conspicuous, was certainly in a position to know the truth of any matter about which he wrote. He has been strongly condemned as a captious grumbler; but though he may be one of the earliest to assert that truly naval privilege, I think that every naval reader of his voluminous writings will admit that a little self-glorification was a venial offence on his part, and need not throw any doubt on his veracity or carefulness. He knew Sir Richard Grenvile personally, and the picture he gives of his character is not out of accordance with his last acts, while it is supported by the stories which were told to the Dutch authority already mentioned.

Let me now glance at those circumstances which led up to, and finally brought about, this famous fight. Immediately on the heels of the defeat of the Armada came reprisals against Spain of that semi-public and semi-commercial character in which the Queen so trusted. Six of the ships which had fought the Armada sailed under the command of Sir Francis Drake, and conveyed an army under Sir John Norris to Portugal. The object in view was a strange one for an expedition chiefly depending on voluntary subscriptions to undertake; it was no less than the re-erection of Portugal into independence. Perhaps one of the most curious touches given to the naval history of the day is the incidental mention of the means of transport available. The ships sailed from Plymouth short of all supplies, but most notably short of transport, and the remedy was found in the impressment of "Easterlings" and in turning over to them soldiers from the overcrowded transports. The expedition had the ill success which it courted, though, as the army actually reached the gates of the Castle

of Lisbon, a very slight increase in munition and supplies would have made it fully successful.

But it deserves mention as it appeared to show that purely naval expeditions were less expensive and more damaging to Spain than joint naval and military ones, and therefore led to that of 1590, which again became the forerunner of that of 1591, with which I am about to deal. Moreover, Drake's flagship was on this occasion that very 'Revenge,' whose superior handling and sailing had, under Drake's command, so pestered the Spaniards in 1588, and which was in two years to be the short-lived prize of Spain.

Drake quitted sea service for a time after this expedition, possibly because therein he was not "blessed" as he desired, "with some lettell comfortable dewe of heaven, some crownes, or some reasonable bootys for his soldyers and maryners;" and because "to want meat, munycyon, and lybertty, was too heavy a burden to beare." Sir Francis was succeeded in the 'Revenge' by Sir Martin Frobisher, and she spent seven months of 1590 off the coasts of Spain and the Azores as part of a fleet of ten Queen's ships, looking out, on the one hand, to intercept the Spanish trade from the West Indies; and on the other, to observe and hinder any naval preparations of the King of Spain.

The King, more alive to the realities than he had been two years before, feared to face the ten English ships with the twenty which he had ready under Don Alonzo de Bazan. He fell back for a time on the weaker policy of forbidding the sailing of the Silver Fleet from the West Indies. Whether this commerce were delayed or interrupted, it brought nearly equal distress on the Spanish merchants; and the long stay of the ships in the Indies would, it was known, so weaken the ships by the ravages of "the Worm," that many years would hardly suffice to repair the damage. In the result, however, not a single Spaniard fell into the hands of our fleet, and a portion of the Indian Squadron trusting to fortune, and passing clear of the Western Islands, found its way in security to Lisbon.

There was still, however, the great body of the Spanish commercial fleet abroad. And though non-success changed the Commanders, it did not change Elizabeth's purpose to gather the value of the Spanish ships into her pocket. Two expeditions were accordingly fitted out, and sailed in the spring of 1591. The larger, under the command of Lord Thomas Howard, son of the Duke of Norfolk: the smaller, under the Earl of Cumberland. Howard flew his flag in the 'Defiance,' of 500 tons and 250 men, and his Vice-Admiral, Sir R. Grenvile, flew his in succession to Sir Martin Frobisher, in the 'Revenge,' also of 500 tons and 250 men. Besides these were the 'Nonpareille,' the 'Bonaventure,' the 'Lion,' the 'Foresight,' and the 'Crane.' The 'Nonpareille' was of like force with the 'Defiance' and 'Revenge,' the 'Foresight' and 'Crane' were smaller, the former being but 300 tons with 160 men. There were besides a few pinnaces and some victuallers.

Howard's squadron went direct to Azores, with the sole purpose of intercepting the "Indian Fleet," as it was called. The Earl of Cumberland's ships hovered off the coasts of Spain and Portugal, both to observe the Spanish war ships and to intercept those silver ships which might escape through Howard's hands.

The King of Spain, on his side, was not idle. The fleet of twenty ships which had, under Don Alonzo de Bazan, been mistrusted as against ten English ships, was now, when increased to forty sail under the same commander, to be trusted against the six or seven ships of Lord Howard. But even this hazard was only to be run in the last extremity. It was not possible to delay the return of the Indian Fleet a second year, but if they put off their hour of sailing to the last moment, Lord Howard's squadron, poorly furnished as all Elizabeth's ships were, might be forced to abandon their watch and to return to England for supplies. But as it happened, fresh stores of victuals had reached the ships, and they were maintaining their post under shelter of the most westerly of the Azores, the islands of Flores and Corvo.

The Spanish fleet was thus composed: 30 sail of war ships—Biscayans, Portuguese, and Spaniards; ten Dutch fly-boats—large flat-bottomed vessels, which had been pressed into the service at Lisbon; other small despatch vessels and cargo ships, the latter to take in certain cargoes waiting at the islands. The Spanish ships, were, as usual, larger and finer, but yet more unwieldy than the English; as usual, also, the war ships were crowded with soldiers, while of such forces the English were entirely devoid. The Spaniards fresh from Ferrol were in a better general condition than the English, who had been some six months away from a home port.

The result of such an absence had been to reduce their stores, their beer and provisions, to a low ebb; and though the victuallers from England, which were still with them when the fight took place, had somewhat replenished them, yet the ships were light, and their ordinary crankness was increased by the fact that a sufficiency of ballast, to replace the consumed weight, could not be had. But the great difficulty of the English was their sick list. Half the people were down with the fevers and scorbutic disorders too commonly due to "weake victuallinge and filthie drink." The 'Revenge' herself had ninety sick. The 'Bonaventure' hardly had men enough to furl her mainsail, and a small vessel had been destroyed for the sake of her crew of twenty, which were drafted to this ship.

Setting aside these two serious matters, it was not to be presumed that—unless Lord Thomas and Grenvile were guilty of neglect which has never been attributed to them—the utter disorder pictured by Raleigh existed in the squadron. It had one sole object in view, the capture of the Spanish Indian Fleet, and in August some of the ships had already arrived at the islands, and the bulk of the fleet might be expected at any moment. To weigh, to cut, or to slip their cables, and to be off into the heart of the fattest prize that had ever gladdened the hearts of English seamen, must have been the momentary expectation of Howard and Grenvile, neither of whose imaginations were slow to conceive the delights of fingering the Spanish gold and silver.

The best anchorage at the Island of Flores is on its eastern side, in a bay of which the town of Santa Cruz forms the northern point. The water is deep, and in about thirty fathoms the English Squadron lay at anchor, on a fine afternoon at the end of August or the beginning of September, 1591. Many of the people were on shore at the time collecting

water, ballast, refreshing themselves on the free soil, and buying or seizing from the "Portugals," their friendly enemies, the fresh fruit and fowls which made new life for the unhappy sick ones on board. There was but a single sail in sight, and she was to the eastward and flew English colours. Neither to the south, nor to the north where ten miles off the limpit-shaped Island of Corvo grew grey in the haze, was there any sign of that fat prize to be seen.

The English ship came in quite early in the afternoon, and her captain reported himself to Lord Howard as Captain Middleton of the pinnace 'Moonshine.' He had been despatched by the Earl of Cumberland from the coast of Spain to warn the admiral of an unforeseen danger. The Spanish Fleet of fifty-three sail in all, most of which were war vessels, was at that very moment on its way from Terceira—180 miles to the eastward only—supposed to be in search of the English, and bent on destroying them. Only three days before Middleton had been in their company, and though he certainly sailed much better than they did, it was a wonder that they were not now in sight on the eastern horizon. Possibly they might—not knowing exactly where the English Squadron lay—have gone to Fayal, and if so, they might make their appearance rather more to the southward. "Had Captain Middleton any news of the Indian Fleet?" "No. Not of the main body, but as some stragglers had already reached the Islands, the main body could not be far off."

Middleton had hardly delivered his alarming message than a general stir amongst the ships showed that something novel and exciting was on foot. Several ships ran their ensigns up to their tops, denoting "Strange sail in sight;" and then, rounding the southern point of the island, and therefore coming from the westward whence the Silver Fleet was expected, and not from the eastward where the war fleet would appear, were seen several ships flying Spanish colours. The wind was from the northward, and as the ships drew clear of the land they hauled their wind on the port tack, and thus stood out about E.N.E.

Here then, at last, was the fat prize—the Indian Fleet—falling innocently into the trap laid for them! But Middleton and Lord Howard were less elated. Suppose that this was not the fat prize, but the war fleet of Don Alonzo de Bazan, what then? It was quite possible that hearing the whereabouts of the English at Fayal, and meaning to "shroud their approach by the island," so that the light and handy British ships should not escape them, they had passed south of Flores in darkness, and had then tacked to the eastward. If they were the war fleet, the usual northerly current would soon sweep them up, and the English would be caught where they lay. If on the other hand this was the van of the Indian Fleet, then nothing could improve the present position. It might be a little time before the Spaniards made out the English Squadron lying close under the land, and every moment would make their capture more easy and more certain.

But before Lord Thomas and Middleton had had time to do more than go over their pros and cons, the leading ship of the Spaniards made the usual signal for discovering strange sails. She fired one of her port guns to the northward, thus denoting the direction of the sails; and she struck her topsail several times, thus denoting the number of sails seen. "Those are no Indian ships," cried Lord Thomas; "the leader is a war ship of the King of Spain! That is the Armada." Said Middleton, "It is the squadron of Seville and the Portugals, with the Admiral. Soon we shall see Brittadona in that mighty and puissant ship of his, with the rest of the Biscayans and the Dutch fly-boats. I know how they sail with their four squadrons drawn together into two, with an Admiral and Vice-Admiral, as our own use is."

Says Howard to his Captain, and says the Captain to the Master and the master-gunner, "Loose the topsail and fire a warning-piece withal, that the ships may collect their companies and weigh their anchors."

"Send," again says Howard, "to the Vice-Admiral, and bid him call his mariners off the shore with all speed. Tell him that these be the ships of the King of Spain, of which I have news by the 'Moonshine,' and not the ships from the Indies. Faith, I trust," continued his lordship, almost *sotto voce*, "the knight be not in the mood to crush glasses with his teeth this day, and that he will yield obedience to his General. But he is of a strong will, and much desires the Spanish silver. I pray he think me not witless as to this fleet."

Soon, in obedience to the signal, the long drift of cables came slowly in on board the ships. Such captains as had to wait for their hands from the shore felt that they would be late for the booty, if this were, as they hoped, the fleet from the Indies; but bound for the galleys of Philip, if, as they feared in view of the greatness of the ships, this was a new Armada. For the longer the delay at anchor, the more difficult it would be to get the wind of the Spaniards, now stretching away to E.N.E., ready to tack and come in upon them.

But presently all were away except the vice-Admiral in the 'Revenge,' who still stuck at his anchor, though with his sails loosed. The Admiral weighed first, firing piece after piece, while he made sail on the port tack, to hasten the others, as he became more and more satisfied that the fleet closing upon them was that of Don Alonzo. As the remaining ships saw how the Admiral held his luff, and kept the wind of the leading Spanish squadron, their captains and companies remembered the stories they had heard of the Spanish King's preparations, and of Don Alonzo's twenty sail of the year before, and they knew that their fears, and not their hopes, were answered. Not they the men to turn their backs if there were any use in turning their faces, but they could not forget the tactics of Drake in the Channel in 1588, when his own handy 'Revenge' was there to remind them. The Lord Thomas was doing that which well suited the discretion and trust of a general, in avoiding to commit himself and his charge to an assured destruction without any hope of prevailing. But if he kept the wind, who knows what a day may bring forth amongst these unwieldy Spaniards and these flat-bottomed Dutchmen? Therefore the remaining ships, all but the Vice-Admiral, either weighed, or, if time pressed, cut or slipped their cables, and followed the Admiral close hauled on the port tack.

But what delays the Vice-Admiral? He lies there with his fighting sails loosed, while the rest of the

squadron are drawing away from him, and while the two squadrons of Spaniards, now in full view, are every moment so crawling to windward, that he can hardly expect to get the wind of their rear squadron, to say nothing of their more powerful weather one. What says the gentleman who bore the Lord Howard's message to Sir Richard. He tells that the Vice-Admiral was in one of his wild ecstacies. That his captain and master could do nought with him. There were still some stragglers on the shore, and God's blood! but he would have them aboard before he quitted his anchorage. That the ships in sight were not those of the King of Spain's, but the silver fleet which was to repair his losses in the Virginian Adventures. But be they whom they might, he would move for no man, English General or Spanish Don, till the passion of his soul had worn itself away. He that first—captain, master, mariner, or gunner—put his hand to the bill to cut the 'Revenge's' cable, let him look to his life—Richard Grenvile was to be obeyed!

But while yet they spoke on board the 'Defiance' of the Vice-Admiral's peril, and regretted that obstinate audacity and self-will which was so uselessly threatening the safety of the 'Revenge' and her crew, and so absolutely thwarting the tactical policy of the Lord Howard, the 'Revenge' weighed, and casting to starboard, filled her fighting sails and followed on the port tack.

The condition of things, as seen from the deck of the 'Revenge,' was now as follows. To the left, a little on her port or weather bow, was the heavy part of the Spanish Fleet, under the command of Don Alonzo. To windward of this squadron, and therefore more to the left, on the 'Revenge's' port bow, were the English ships, in a straggling order, the Admiral and others being ahead and to windward, while the 'Foresight' and some of the victuallers were nearer the 'Revenge.' The leading Spanish squadron was in the usual cluster round their chief, and immediately ahead and on the lee, or starboard, bow, to the right of the 'Revenge' was the second squadron under Brittadona; these were also in a cluster, but as usual, more straggling, so that they spread along the lee quarter to where their rear ships were just opening from the south point of the island.

The 'Revenge' was one of the fastest, as well as one of the handiest ships in the navy. She was under her "fighting sails," her fore and main topsail and her foresail. She had yet to set her square mainsail, often called from its size, her "Great Sail," and her latten mizen. Now that the 'Defiance' had got out into the current, it was seen that she and the rest of the English ships could easily keep the wind of the Spaniards, even under their fighting sails. But the 'Revenge,' by her long delay, would have had more difficulty, as while she lay at anchor the Spanish ships had been swept so far north by the current. But it was, even in her case, pretty certain that she could do well what she liked, if she set her mainsail.

Sir Richard Grenvile still remained in the state of stormy passion which was habitual to him. He glared round upon the crew, who hated him for his severity and fierceness, and who feared him much more than any Spanish force, however powerful. He gnashed with his teeth, as if even then crashing between them, in bravery and defiance, the glasses which in Spanish company he sometimes made believe to swallow. That great will of his was asserting itself, and, backed by his passion, was dominating his reason. "My Lord Howard," he muttered, "when I have shown you your error, and that the ships you are flying from are none other than the Plate Fleet, you will think to claim the best for your plans at Audley End! But, my lord, he who is frightened at shadows must take the consequences! Captain, let the master gunner see to the loading of his pieces, and take his place to leeward."

"Sir Richard, Sir Richard," replied the Captain, "these be not the ships of the Silver Fleet! The gentleman from the Admiral expressly told me that Middleton knew the ships, and that those ahead of us are the squadron of Don Alonzo de Bazan, while those to leeward form the squadron of Brittadona."

"Be they what they will," cried the Vice-Admiral, in return, "they shall give way to Richard Grenvile. Helmsman! Bear away!"

A momentary hesitation on the part of the helmsman, and almost a start on the part of the Captain and Master, showed the portentous nature of the movement, which was, in effect, to drive the 'Revenge' between the two squadrons of Spaniards, and across the bows of Brittadona's great ships. A peal of fire was the answer from these latter, as, to their astonishment, they saw the single English war ship plunging into a destruction as certain as that which in later years was known to await the wonderful six hundred at Balaclava.

"By God's body!" exclaimed Grenvile, as the storm of "random shot" flew high over the masts of the 'Revenge,' "it is as you have said, good Captain. But these Spanish dogs shall give way to Grenvile for all that. 'Tis too late now to keep the wind of them, we will even push through!"

"Too late?" cried the Captain. "Not so, Sir Richard. The 'Revenge' has the heels of any Spaniard. Helmsman, luff! Master, cut the great sail loose; We will tack, Sir Richard, and rejoin our General where he waits for us to windward."

A dozen men had swarmed aloft to cut the mainsail loose, almost before the order could be given. But Grenvile stayed them with a shout—"I will hang the first man who dares to cut a stop! Helmsman! bear away!"

There was then a moment of dead silence, and a quivering glance of astonishment and of fear in the look which all eyes turned upon the fierce, enraged figure of the Vice-Admiral. The whole matter covered but an instant's pause, and then the Captain exclaimed loudly enough for all near him to hear—"That which will be done, will be, betwixt this and dark. I hope in God that he will make us strong enough for them, for all are men of good courage here. God send Sir Richard Grenvile as much honour and all good fortune as heart can wish! Master and mariners all, we will even push through as the Admiral desires."

The moment of irresolution had passed, and that strange phase of excited determination which imminent danger rouses in the English nature when it has warning, gained the mastery of the 'Revenge's' reduced company. Such of the sick as were able, fell into their usual places. Such as were unable for the fight had long before been carried below to the usual place of safety, the hold, and were now, in the empty condition of the ship, laid upon the ballast. There also

were the surgeon and his mates, ready to receive the wounded. The usual division of the company was made; one-third to work the guns under the direction of the gunner; one-third to ply the small shot under care of the corporal; and the remaining third to trim and work the sails under the orders of the Master. But, as usual in a fight, as it grew fiercer each part assisted and mingled with that which most required strengthening.

As the little 'Revenge' drew closer and closer to the mighty Armada, it was seen that she would either fall on board of the leading ships, or that they must tack to let her pass. As yet, though the Spanish fire was sustained, and was replied to by the starboard guns of the 'Revenge,' not much damage was done, the random shot of both forces flying for the most part harmlessly overhead. It was now that the one of the English ships nearest to the 'Revenge'—the victualler, 'George' of London—bore away under the lee quarter of the 'Revenge,' and her Captain hailed to know what he should do. Grenvile hailed him back again to haul his wind and save himself. The 'Foresight,' too, being, as I have said, nearer to the 'Revenge,' now edged off a little, and began firing on the rear ships of Don Alonzo's squadron. And now also one or two of these rear ships kept away a little for the purpose of engaging the 'Revenge' to windward. Remarkable amongst these was a great ship three times the size of the 'Revenge,' and known afterwards to have been the 'San Philip.'

But the strange sight was now seen of the leading Spaniards on the lee bow of the 'Revenge' doing that which Grenvile swore they should do—giving way to the English flag. Three or four of them threw themselves in the wind, and came round on the starboard tack, thus actually facilitating the effort of the 'Revenge' to push through. This movement of theirs also slackened the fire of the Spaniards for a time, as the guns could not be freely used in the act of tacking and as the movement threw the ships which had tacked across the line of fire of their friends.

But even the slackened fire was now getting hot; the sails and rigging of the 'Revenge' had been cut about in many places, and every moment the fall of the Spanish shot was becoming lower. The great 'San Philip' was now also using her starboard guns, and being replied to by the port guns of the 'Revenge.' Both sides were yet firing random shot, that is, shot from guns which were elevated as much as their carriages would allow. But as each side saw the lowering damage on the rigging of their opponents, gun after gun was levelled, and the earnest work of point blank discharges went on. Presently, too, the deadly work of the small shot from hundreds of match and wheel locks, in the hands of the Spanish soldiers, began to tell heavily upon the reduced crew of the 'Revenge,' who, by reason of having to employ both broadsides of guns at the same time, could have but a diminished party to ply the small shot in return.

But still the ship held on her course, drawing as she did so, more ahead of those ships on her starboard side, and which being more distant, had not tacked; there was a good hope that she might yet push through and make sail to leeward; especially now that her hull was suffering instead of her masts and sails. Her excellent sailing qualities were making themselves manifest, as the first ships which had given way to her by tacking were now seen, having tacked again, to be unable to gain upon her in coming up astern.

The blood of the men was fully up; Grenvile alternately cheered, stormed, prayed, and devoted the Spaniards to perdition. Exposing himself with determinate rashness, and remaining unharmed amid the crash of shot, the whiz of the small shot and the whirlwind of splinters, he bore in his face the light of triumphant bravery, and stirred to new exertions those who looked on him. Whatever his faults, and however great the mistake to which his passion had led, he stood there a grand man amongst a splendid band.

Next perhaps, in dogged resolution, to the Vice-Admiral, was the Master-gunner. A man, every whit as hot in passion and as reckless of consequences as Sir Richard, he had given no encouragement to the Captain and Master in their endeavours to turn the latter to a more politic course of action. He now sprang from side to side of the ship, directing each broadside of guns alternately, and calling to the helmsman to luff or to bear up according to the setting of the sea, and the position of the enemy's ships, so as to have his better level for the guns at the moment of discharge. At the instant when the truth as to the strength of the war fleet of Spain broke upon the mind of Grenvile, he had sworn that he would rather die than turn back now, and the Master-gunner had repeated the oath as he ordered the starboard broadside to vomit its first fire.

But, however great the superior sailing of the 'Revenge' might be, and however the spirits of those on board were cheered by the prospect of pushing through the enemy, that triumph was not to be. However dangerous a foe the great 'San Philip' might be from her offensive power, she was about to show herself more terrible by an undesigned act. Slightly edging away from to windward, and gradually closing on the 'Revenge,' this great ship drew into the wind's eye, and by consequence becalmed the sails of the English vessel. Where, then, was the advantage of her superior speed? She lost way; the 'San Philip' bore more closely down upon her, on one side, while some of the ships which had tacked to leeward now gained on her and showed signs of grappling on her lee or starboard quarter, and foremost amongst these ships was that of Brittadona himself. Thus the unhappy Vice-Admiral found himself between two close fires, and about to be boarded on both sides. Escape was now abandoned as hopeless, but there was no thought of surrender—indeed, in those fierce times, the thought of surrender was accompanied by the thought of the legal tortures of the Inquisition. But this thought could hardly have dominated the mind of Spanish-speaking Grenvile. Captain Monson was at this very time a prisoner-of-war at Lisbon and suffering no such rigours. But it did not occur to those English minds to surrender. They had a fight to do, and they would do it as long as they could. When they could not fight any longer, when they were all either helpless from loss of blood, or stricken to death, then the fight would have its natural termination. Meantime, until that result was achieved, the yeoman of the powder room would continue to hand

up his powder; eighteen pounds for his demi-cannon and twelve pounds for the culverins. The privileged gunners, of whom the ship originally bore thirty, under the direction of the quarter-gunners, charged and re-charged their pieces, ladling the loose powder to the bottom of the bore, and rolling the loose shot down to it. The mariners and sailors forming the crews ran out the charged pieces, while the matchman knelt and blew upon his match ready to apply it at the Master-gunner's order. The loss of the wind had taken away the work of the Master; and the boatswain could only with a small party knot and repair those main parts of the rigging, on which the masts depended. But the corporal's party of men at work with small shot was increased now that the enemy was closed, and these people filled and re-filled their bandoliers from the budge barrels handed up from the powder room.

But a settled order for the fight was fast becoming a thing impossible. Spars, ropes, and canvas were falling continually and hampering the guns. Men, more precious, were falling at their posts, under the rain of lead and iron, either to be hastily passed below wounded, or more hastily thrust overboard dead.

Now the 'San Philip' fell alongside the 'Revenge' on the port side, and collected her men to board her. But the Master-gunner was prepared with a broadside which shook the Spanish nerve; a volley of small shot, a thrust of the long keen pikes: the 'San Philip' misliked her entertainment and sheered off. At that moment Brittadona fell aboard to leeward and stuck to his work. Four other ships grappled soon afterwards, two on each side, and now the hand-to-hand conflict raged in confusion. The decks of the 'Revenge,' slippery with blood, afforded small grip to the feet of her defenders in the roll of the ship from side to side. Then the crash and tear of the wood-work of the six ships clustered in a death struggle, was hardly less destructive to them than the shot which now passed backwards and forwards through all parts of the hulls. It was impossible to keep the 'Revenge' free from the pollution of the invaders' feet. The Spaniards boarded her again and again, but the Vice-Admiral, Captain, the Master, and the Master-gunner—the leading officers of the ship—all remained unwounded and alert. Under their shouted orders the company tore from point to point wherever the danger was greatest. Climbing over the fallen spars, and struggling, as in a net, with the tangled and torn sails and rigging, they pushed back the Spaniards, who had entered for a moment, wounded, scared, and beaten into their ships again, or into the sea.

The fight had not opened till three o'clock in the afternoon, and it was now growing dusk. Two of the ships which had actually grappled the 'Revenge' were evidently in greater suffering as to damage than she was herself; as darkness came on they went down beside her, and the attention of her foes was diverted to saving their crews. The 'Revenge' was for a time free, and able to make preparations for those dark hulls which, as fresh ships, still kept closing on her. It was the same thing over and over again as darkness gathered a heavy cluster of ships round the gallant and unyielding English. Attempts at boarding more or less sustained, but always beaten back by the continually diminishing force in the 'Revenge'—a cessation of the battle for a time, and then another struggle.

It was now that he, whose passionate magnanimity and stubborn rashness had brought into one astonishing focus all this moral grandeur, physical suffering, and material desolation, fell upon the deck wounded in the body by a musket ball. He was carried below senseless, and the wearied surgeon applied himself to his probes and his dressings. But not to him was to be allotted the task of preserving Grenvile's life; he was engaged on the wound when struck to death by a shot which inflicted a second wound on Grenvile—this time in the head. Then he lay down, and sometimes speechless, sometimes awake to his condition, listened to the sad complainings of the wounded who surrounded him, and to the confused clamour from the deck. Now shaken by the discharge of a demi-cannon above him, now pained by the eternal roll of the ship. But for all this, not losing colour, courage, or determination. Daylight found things above and below as described, and then it was that for the first time that Captain and Master began to review the situation. The Vice-Admiral was wounded—probably to death. There were 80 or 90 of the original sick still lying on the ballast, and the water from shot holes was rising so, that they would soon drown where they lay. Not less than 40 bodies had been cast overboard, and the unwounded might be numbered on their fingers. It was clear that there was no more fighting to be done—what else was possible?

Sir Richard, in a moment of consciousness, had his terrible views on that point. His talk to the wounded, and to such of the company as passed him from time to time, was of the mercy of God and the shortness of life. What mattered a few days more of pain and misery? Why not shorten it? They had all fought a wonderful fight, like valiant and resolute men—why not complete the task, and leave absolutely nothing for the Spaniards to boast about? Where was the Master-gunner? He was a resolute man.

The Master-gunner hearing that Sir Richard had asked for him, soon attended. No sense of weariness or of failing resolution troubled him; and he, too, had some ideas about the proper method of proceeding before the Spanish ships should close round them again, and make an entry into the 'Revenge,' because no force remained to forbid them.

"What powder was now left in the powder room?" asked Sir Richard.

There was only one barrel still remaining, but, skilfully placed, it might very well do what the Vice-Admiral desired, and keep the 'Revenge' for ever out of the hands of the Spaniards.

"My father went down in the 'Mary Rose'" cried Grenvile, through his set teeth; "and I will even go down in the 'Revenge.' Master-gunner do thou take the order from me; split and sink the ship!"

But an Admiral half-fainting, wounded in the head and body, and lying helpless, was no longer the responsible commander of the 'Revenge.' The Admiral Don Alonzo de Bazan, had himself drawn near to see this great sight of a conquered but unsubdued Englishman! The responsible officers on deck had determined on their course, and the Master bore the terms of a capitulation—not of a surrender—to the Spanish Commander. "The battered and sinking hulk full of wounded and sick over there, would

yield herself if all lives should be spared; if the mariners and common sort were set free, and the better sort held to reasonable ransom. Were these terms not accepted, the Master-gunner had his orders from the Vice-Admiral, and would be let out of his cabin where he was now secured. That was all." "Two ships sunk;" thought Don Alonzo, "over 1000 men killed and wounded; fifteen of my ships more or less damaged; and all by one little English ship! There are eight or ten more of them not far off; I shall do well if I acceed to these terms."

So the Master went back to the 'Revenge,' and her tattered red cross came down. The Master-gunner was let out of his cabin. Grenvile, and the Captain in his suit of black velvet were to go on board the Admiral's ship, the rest of the old 'Revenges' were to be distributed, except perhaps some few of the wounded. The command was gone from Grenvile's hands by the fortune of stray missiles—what mattered the rest? "Let them do with his body what they would," he said, as they came to carry him away. Then the movement was too much for him—he fainted; but recovering for a moment as he got into purer air, the nearness of the hidden world smote him. "Pray for me," were the last words he uttered on board the 'Revenge.'

The story of the fight is told when Grenvile's weakened body leaves his ship. That he died a few days later on board the Spanish Admiral's ship appears to be certain. Where he was buried is unknown. That he bore his wounds with the composure of great physical power, and hardly changed demeanour or colour, in such sort as to surprise the Spanish officers, Van Linschotten tells us; and it is he who also gives us those illustrations of his character which confirm Monson, in spite of the vehement denials of those whose minds are unsatisfied unless a hero should be all hero. Linschotten also has handed down to us the final well-known words, "Here die I, Richard Grenvile, with a joyful and quiet mind, for that I have ended my life as a true soldier ought to do, fighting for his country, queen, religion and honour." Words which might have come from the lips of a Nelson, but which a Nelson would never have uttered in any tongue but his own; and then they would have borne only the sense of resignation which the mere words convey. But the prisoner, Grenvile, in the hands of the Spanish Admiral, who would neither see him nor speak to him, uttering the words *in Spanish*, fires a last shot at his enemies and dies as defiant as ever.

The contemporary writers dwell with complacency on the effects of a storm which followed this battle, and destroyed large numbers of the Spanish ships, as well as the poor 'Revenge.' Raleigh says she was cast away at St. Michael's, but Linschotten tells us that it was against the cliffs of Terciera that she dashed herself to pieces, and as a single wounded English seaman escaped from the wreck and was befriended by that author till he died, he is unlikely to be wrong.

ROBERT LENDALL.

Reviews.

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MEMOIR ON THE INDIAN SURVEYS.*

THE first edition of the *Memoir on the Indian Surveys* was published in 1871. Its object was to furnish a general view of all the surveying and other geographical operations in India from their first commencement; in order that, in reading reports of current work, ready means of reference to the previous history of each branch of the subject might be at hand. In case it should be desired to follow up an enquiry into the details of any particular operation or series of operations, the references in the foot notes were made as copious as possible. The Sections, into which the first edition of the Memoir was divided, contained histories of the Marine Surveys, of the Route Surveys in the days of Major Rennell, of the Great Trigonometrical Survey, of the Topographical Surveys, of the measures for the Supply of Instruments for the Surveys, of the Geological Survey, of the Archæological Survey, of Meteorological Observations, of Astronomical Observatories, of researches relating to Physical Geography, and of the Geographical Department of the India Office.

The result of the publication of this first edition was very satisfactory. It was a part of the plan that the Memoir should be supplemented by "Annual Abstracts" on the same model, each abstract being a memoir for one year; and at the end of seven years the contents of the Annual Abstracts were to be embodied in the second edition of the Memoir. Accordingly, these abstracts of the operations of the surveys were published from 1871 to 1876 inclusive, and in 1877 the time came for the appearance of the second edition of the Memoir. This second edition was completed by the end of 1877, but, owing to much unnecessary and harassing official obstruction, it was not published until August 1878!

In the new edition of the Memoir it has been found advisable to increase the number of Sections. An additional sub-section has become necessary for the Marine Survey Department, and separate Sections have been added for the route surveys beyond the frontier of British India by native explorers, for the Revenue Surveys, for Tidal Observations, for the Statistical Survey of India, and for a discussion of the orthography of Indian proper names. The operations treated of in all the Sections have been brought up to date, and a general index has been added. In other respects the arrangement of the two editions is identical.

All who have been concerned in furthering the operations of the various Indian Surveys must look back with feelings of deep satisfaction to the amount and character of the work that has been achieved in the interval between the publication of the two editions of this Memoir.

The same system of publishing annual reports will be continued, but the title, instead of "Abstract of the Surveys," will in future be as follows:—*The Indian Surveys, 1878. An Annual Continuation of the Memoir on the Indian Surveys.*

* *A Memoir on the Indian Surveys.* By Clements R. Markham, C.B., F.R.S. (Second Edition), 1878. Printed by order of the Secretary of State for India in Council (pp. xxix. and 481, with five maps). Sold by Messrs. Allen, 13, Waterloo Place; Stanford, 55, Charing Cross; King & Co., 65, Cornhill; and Trübner & Co., 57 and 59, Ludgate Hill.

LANGUAGES OF THE EAST INDIES.*

MR. ROBERT CUST contributed two articles on the geographical distribution of the languages of the East Indies, illustrated by two language maps, to our numbers for January and February 1878. The present volume is a very considerable amplification of those articles, and is a comprehensive and pains-taking attempt to bring the whole of our existing knowledge of an important subject into one focus. Mr. Cust discusses, in due order, the Aryan family of Indian languages, the Dravidian, the Kolarian, the Tibeto-Burman, the small Khasi family, the Tai and Mon-Anam, and the Malayan. He then considers the number of languages into which each of these eight families should be divided, and the amount of dialectal variation which constitutes a dialect of a language. A difficulty is found in deciding whether a form of speech is to be considered as a sister language or merely as a dialect, and of course much of the classification adopted by Mr. Cust must be looked upon as provisional.

From a geographical point of view the most important part of the investigation lies in fixing the boundaries of language fields, and for this purpose the Census Reports have supplied useful data, although the present boundaries are mere approximations. In treating of each language, Mr. Cust first endeavours to define, with as much accuracy as is attainable, the boundaries and area of the language field. He then gives some account of its affinities, of the grammars and dictionaries that have been published, of the literature of which it is the vehicle, and of its dialects.

Mr. Cust defines his object as twofold, to display the extent of the field, and to bring to one focus the labours of the past, and at the same time to organise some scheme of general co-operation for the future. There can be no doubt that a very great and valuable service has been done by Mr. Cust in thus laboriously and conscientiously bringing together in one volume so large a mass of information on an important subject, and above all in applying to this mass his remarkable powers of classification, and orderly arrangement.

BAY LEAVES. A TRIBUTE TO ENGLAND'S HEROES. By *E. Garnet Hall.* (Provost and Co., 1878.)

THIS is a little volume of poems dedicated to Sir George Nares and the Officers and Men of the Arctic Expedition of 1875-6. The first—"A God Speed to the Arctic Expedition"—was recited at the banquet given at Portsmouth before its departure; and another of these poems—"Welcome Back"—was set to music and sung by the band of the Royal Marine Artillery when the expedition returned. The other Arctic poems are "A Welcome to King Frost," "Our Thanks to King Frost," and "The Arctic Expedition." The volume contains several other poems, most of them intended to commemorate the services of England's heroes in various parts of the world; and all displaying a cultured imagination finding expression in verse of more than average merit.

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* *A Sketch of the Modern Languages of the East Indies, accompanied by two Language Maps.* By Robert N. Cust, &c. (Trübner 1878), pp. ix. and 198.

THE CEYLON DIRECTORY: CALENDAR AND COMPENDIUM OF USEFUL INFORMATION. (Edition of 1878). To which is added a Planting Directory for India (Coffee, Tea and Chinchona Estates), with much Useful Information referring to the enterprise of the opposite Continent. Compiled and edited by *A. M.* and *J. Ferguson.* (*Ceylon Observer* Office).

THIS work will be found most useful not only to the enquirer desirous of obtaining accurate and detailed information, but also to all persons who are engaged in industrial pursuits in India or Ceylon, or who contemplate the investment of their capital in those eastern possessions of Great Britain. The Directory, in the first place, contains a complete statistical record of the progress and present condition of the colony in all its administrative departments, including a table of events, arranged chronologically, which amounts to a succinct history of the island.

But the most valuable feature of the Ceylon Directory is comprised in the practical papers on the cultivation of tea, coffee, chinchona, the cocoa palm, tobacco, and cassava. Mr. Ferguson deserves the gratitude of all who are interested in the industrial enterprises of Ceylon and India for the conscientious care he has bestowed on this portion of his most useful work.

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RETURN OF WRECKS AND CASUALTIES IN INDIAN WATERS FOR THE YEAR 1877, TOGETHER WITH A CHART SHOWING THE POSITIONS IN WHICH THEY OCCURRED. Prepared by *R. C. Carrington, F.R.A.S., F.R.S.L., Registrar of Wrecks, Marine Survey Department* (Calcutta 1878).

THIS is one of the valuable annual publications issued by the Indian Marine Survey Department, and it shows the great value of that department as a channel for obtaining and publishing really accurate information, for the number of reported wrecks and casualties in Indian waters, during 1877, has considerably exceeded that of any former year since an official record has been published, although the year was marked by no particular cyclonic storm; and the only conclusion to be arrived at is that the former statements have been incomplete. There is no increase in the number of wrecks, but a great change in the care taken to record them accurately.

There were 32 wrecks of English, French, and American ships, 4 Arab, 29 Burmese and Indian native craft, or a total of 65 ships (26,847 tons) and a loss of 138 lives; besides 98 casualties to ships. Many merchant captains persist in using charts issued by private firms which have not been corrected for the latest information, and nine wrecks, during 1877, have been distinctly traced to this cause. The Board of Trade should make the owners of ships responsible for the supply of correct official charts.

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THE *Bulletin of the Société de Geographie Commerciale de Bordeaux* (Nos. 14, 15 and 16), contains some interesting articles. Among these is one on the rich mines of Copper pyrites at Castifao and Moltifao, in the northern part of the island of Corsica; on the people resident at the Cape of Good Hope, who bear French names, and whose ancestors emigrated originally to Holland and then to the Cape; on the revocation of the Edict of Nantes; on the economic geography of Frankfort-on-the-Main; and a notice of the discovery of some fossil elephant bones found at Pombonne near Bergerac.

Log Book.

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The Surveying Expedition of Sir George Nares.—It is satisfactory that the work of surveying and exploring, one of the most important public duties performed by the Royal Navy, is now receiving more attention than has been the case for some years. There are four regular surveying ships in commission. The 'Sylvia' is doing valuable work in Japanese waters, under the able direction of Commander Pelham Aldrich, one of our leading Arctic sledge travellers; the 'Nassau,' under Captain R. H. Napier, with whom is Lieutenant Pirie, R.N., who served in both the Arctic voyages of the 'Pandora' with Sir Allen Young, is on the coast of China; and the 'Fawn,' commanded by Captain Wharton, is on the east coast of Africa.

On the 20th August 1878 Sir George Nares again commissioned the 'Alert,' at Sheerness, for surveying service in Magellan's Strait and the South Pacific. Since his return from the most successful and brilliant of all modern Arctic Expeditions, Sir George has been actively engaged in the preparation of his record of the voyage which was published last June, and which will be an enduring monument of valuable scientific work nobly and thoroughly executed. We rejoice that the old 'Alert' is still to be employed, under her former gallant leader, although not on that glorious Arctic service which has made her name immortal. We fear that two or three years will be wasted before English Arctic enterprise is again renewed, but meanwhile it is well that the brave old 'Alert' should be employed on useful service.

Under Sir George Nares the 'Alert' has five carefully-selected executive officers. The first Lieut., George R. Bethell, was in the 'Challenger.' The second Lieut. is the Hon. Foley Vereker, who did good service in the 'Nassau,' on the east coast of Africa, under Captain Gray, and is an admirable draughtsman. Lieut. Gordon S. Gunn received his surveying training in the 'Sylvia,' under Captain St. John; and the Navigating-Lieut., W. H. Petley, was in the 'Nassau.' He is the brother of the officer of the same name in the Indian Marine Survey Department. Sub-Lieut. James H. C. East passed in March 1877. The medical officer is Dr. Coppinger, who was Surgeon of the 'Discovery' in the late Arctic Expedition. Dr. Coppinger's scientific attainments are of a high order. He wrote a most valuable paper on the Petermann Fjord and Glacier, which he explored with Lieut. Fulford, and his telling evidence before the Scurvy Committee alone refutes the absurd report of that body. The Paymaster is Mr. North, an officer who served in the 'Nassau,' and who is warmly interested in surveying work. He also served in the 'Hydra' turret ship, under Captain Markham, from April to August 1878. Sir George Nares will have with him two or three of the old Arctics, besides Dr. Coppinger. Robert Joiner, the leading Stoker in the 'Alert,' again joins her as Engine-room Artificer. Spiro Capato, the Steward in the Arctic Regions, also rejoins the 'Alert:' and we believe that George Winstone, a young Able Seaman who was in the 'Challenger,' and also in the Arctic Expedition, is again to serve under Sir George Nares. Winstone was one of Lieut. Parr's sledge crew in the Northern Division, and behaved most gallantly.

The first work of the 'Alert' will be in Magellan's Strait. Captain Mayne's survey extends from the Atlantic entrance at Cape Virgins to about Port Famine, with bits further westward. The triangulation from Cape Froward to Cape Pillar, and the survey of channels to the northward remain to be executed. Steamers used to enter the inner channels from the Gulf of Peñas in 47° 30′ S. on the Pacific coast of Patagonia, but there is a dangerous place in Smyth's Channel, called the English Narrows, between Wellington Island and the main, owing to which steamers have lately been ordered to avoid this part of the route, and to enter the inner channels from the Gulf of Trinidad in 50° S. One important piece of work to be done by the 'Alert' is to explore the channels supposed to exist between the western side of Wellington Island and some outlying islands, so as to survey and explore another protected route for commerce. The work in Magellan's Strait will occupy from one to two years.

Sir George Nares will then proceed to execute several isolated but important surveys in the South Pacific. The first of these will be fixing the positions of Minerva Reef, in about 136° 30′ W. longitude; of the Duke of Gloucester Islands; of Mopiha, or Howe Island, one of the Society Islands; and of Mauki, S.W. of the Society group. There are also some remarkable changes in the depth of the sea, caused by volcanic action, in the neighbourhood of the Friendly Islands; and a ridge with less than twenty fathoms lying east and west to the north of the Fijis, and extending to Mitre and Cherry Islands. D'Entrecasteaux reef, to the north-west of New Caledonia, also requires surveying, and there are several reported dangers which need investigation, between New Zealand and the Fijis. Finally, we believe that the 'Alert' will complete the soundings on the south-western coast of Australia, from Houtman's Albrolhos to King George's Sound, including Geographe Bay.

The Dutch Arctic Expedition.—Good news has been received from the gallant little 'William Barents' up to the 22nd of July.

After leaving Bergen on the 18th of May, the Dutch explorers experienced a succession of northerly gales, in which their vessel behaved splendidly, but which tried their patience not a little. Still they kept steadily to their task and at last arrived at Jan Mayen Island, where they intended to land. But just before reaching the anchoring ground, they were driven away by a tremendous storm, and were obliged to steer to the north in accordance with their instructions. They proceeded along the West Greenland ice as far as 80° N., and then along the north coast of Spitzbergen to Wyde Bay, but northerly gales prevented them from going more than thirty miles away from the coast. Returning to Amsterdam Island, they made a good series of magnetic observations at Sabine's observatory, and then shaped a southerly course to Bear Island, which was reached on the 15th of July. From Bear Island they went to Vardö to post their letters, sailing thence for the Barents Sea and Novaya Zemlya on the 23rd of July. Many valuable magnetic, meteorological and other observations had been taken,

zoological collections had been made, and all on board were in good health and excellent spirits. They expected to find the pack ice far to the north, in the Barents Sea.

Cummunications in Assam.—A memorial on the subject of the urgent necessity for improving the communications in Assam was presented to the Secretary of State for India on the 24th and the signatories of the memorial, including Sir Rutherford Alcock, K.C.B., Colonel Hopkinson, C.S.I. (late Commissioner of Assam), Colonel Godwin Austen, Mr. Maitland (Director of the Assam Company), Mr. James Warren (Director of the Wilton Tea Company), Mr. J. B. Chalmers, Mr. Alfred J. Holiday, and Mr. Langford Locke had an interview with Viscount Cranbrook at the India Office, on the 31st of July, 1878.

The deputation pointed out that the fertile soil and unvarying rainfall of Assam ought to make the province the natural provider of grain for all the neighbouring districts of Bengal; while it is in fact a large importer of rice for the use of coolies in the tea plantations. The reason is that the supply of labour in Assam is so deficient, so difficult of increase, and so costly that it would not pay to employ it in the cultivation of low-priced grains. The consequence is that vast tracts of fertile country are lying waste for want of the needful labour to render them productive. One great object, with a view to remedy this evil, is to improve the communication between Calcutta and Assam, and it appears that the Government of India is alive to its importance. It is in contemplation to establish a fast line of steamers between Dibrugarh and some point near Dhubri, together with a short railway from Rungpur on the northern Bengal line to Dhubri. But the second object of the deputation is of most interest to geographers. It is to explore the region between Upper Assam and the Chinese provinces of Yunnan and Szechuen, where a large, needy and industrious population might supply a considerable portion of the required labour. The deputation very properly deprecated the short-sighted and mischievous reductions which have recently been made by the Government in the Survey Department, and especially the abolition of the most useful Topographical party in Assam, which has, it is said, been carried into effect.

Colonel Godwin Austen stated that at the village of Shangkam, on the banks of the Tenga-Pani river, a tributary of the Brahmaputra, three or four days journey east of Sudya, a petty chief resides who acts as interpreter between the Deputy Commissioner and the Singphus and Kamptis at the Sudya fair. This man has been to China and is prepared to act as a guide. Half way between his village and the River Irawadi is the town of Hobong where supplies could be renewed, an important point. Our relations with the hill tribes round the Assam valley have been continually improving for some years past. The presence of the officers of the Survey, who are accustomed to these people and their ways, has a very beneficial effect; and Colonel Godwin Austen considers that Lieut. Woodthorpe and other surveying officers could surmount the difficulties, and extend their explorations to Bhatang across an intervening narrow belt of 180 miles.

The importance of the interests concerned in the welfare of Assam furnishes a claim which cannot be ignored. According to the latest return, that of 1876, there were 34,000 coolies imported into Assam in that year, making a total of 190,000 engaged in the province, and there were 800 tea gardens, 37 of which were opened last year. The out-turn of tea for this year, is estimated at not less than 34,000,000 lbs.

Efficient measures ought to be adopted for improving the communications of a province which contains so important an industry; and, in connection with these measures, most valuable geographical work should soon be undertaken, in exploring the still unknown region between Upper Assam and China. Lord Cranbrook, in reply to the Deputation, said that the requests it had urged, appeared to be both reasonable and important, and that he would communicate them to the Government of India.

Indian Coast Surveys.—A Survey of Paumban Pass has just been made by Mr. M. Chapman and one assistant, which will be shortly published. It will not only be of considerable use to navigators, but it is of still greater importance, as, from the elaborate detail in which it has been drawn, a clear idea of the exact state of the Ship Channel or "Pass" and its capabilities of improvements are at once demonstrated. It is rather a pity that Mr. Chapman has as yet given us no opinion as to the feasibility and value of further operations for the improvement of the "Pass," as it appears from his remarks that, between 1830 and 1854, works which cost only Rs. 350,000 improved the depth in the channel from 2¼ feet at low water to 10¼ and 15 feet, the depths at present obtained. It appears also from his description of the "Great Dam" that something might be done to confine the water, which now rushes over and between the rocks of which it is composed; and that if, as he says, "the northern Great Dam was built upon—say in three sections—to a height of 5 feet *above low water*, a much greater scour would be sent through the 'Pass' and deeper water obtained in the Sandbank Channel." From the records of the Marine Department it appears that in the years 1873-74 and '75 there was considerable traffic through the "Pass," the receipts on account of pilotage being from Rs. 22,234 in the former to Rs. 23,404 in the latter year; since then, however, there had been a marked falling off, as the receipts for 1876-77 only amounted to Rs. 18,709, and for 1877-78 only Rs. 10,553. In 1851 the receipts were Rs. 7716. Mr. Chapman does not give us any opinion as to the cause of the falling off apparent in the traffic through the "Pass" since 1875, and it would be worth while to enquire into this.

Lieut. Jarrad, R.N., and his party have also completed the survey of Viziadroog and Rajapur bays, with the intermediate coast. On comparing this survey with Montriou's survey of 1844 it does not appear that the former port has in any way deteriorated, but rather improved, if anything, in the depths of water obtained. Montriou's surveys, however, were hardly charted in sufficient detail to allow of a proper comparison being made. This little port would afford perfect shelter during the S.W. monsoon to vessels drawing 12 feet; and if vessels were moored head and stern, at least six could lie there at a time. During the N.E. monsoon it is a capital anchorage, and vessels of any draught can anchor there. Rajapur bay would also afford anchorage in the S.W. mon-

soon, but it is by no means so well sheltered as it is open to the westward, and on this part of the coast the wind during the monsoon is seldom southward of W.S.W. Charts of these surveys, as well as of Ratnagiri, will be published in Calcutta as soon as possible.

A new chart of the Gulf of Martaban, including the recent surveys of Rangoon and Maulmain rivers, with other additions, and corrected to the latest astronomical positions, has lately been issued by the Marine Survey Department, Calcutta. We observe what we consider to be a decided improvement in this chart on the old practice of depicting the character and limits of lights. On this chart the true limit of visibility of the light is shown, as well as the arc. On most other charts, including the Admiralty ones, the line showing the arc of visibility is not made to serve the double purpose, and is drawn at no particular radius. A chart which shows at a glance whether the estimated position of the ship comes within the limit of visibility of a light, is a much greater help to the navigator than one that does not.

These charts are published by the Department for immediate use in India, and are very clearly printed by the photo-zincographic process, which has been brought to such a high standard of excellence, under the superintendence of Captain Waterhouse, at the Surveyor-General's Office at Calcutta.

A Lighthouse on Cape Guardafui.—It is a disgrace to the civilized world that no international memorial has yet been raised to the late Captain Maury, the accomplished author of *Physical Geography of the Sea*, to whom the seamen of all nations owe more than to any other man who has lived in the present century. Captain Maury's friend and coadjutor Commodore Jansen, of the Royal Netherlands' Navy, (who wrote the memoir in our number for March 1873, p. 380) proposed that this international memorial should take the form of a lighthouse, and he has since suggested that no better site could be selected than Cape Guardafui.

The wrecks during the year 1877 strongly confirm the view of Commodore Jansen that a lighthouse ought to be erected on this cape. Hazy weather constantly prevails near Guardafui, and it is consequently exceedingly difficult to estimate distances. Two vessels, the 'Cashmere' and 'Meikong,' were wrecked this year in consequence of the absence of a light. Mr. Carrington, in his *Return of Wrecks for* 1877 says that a light ought to be placed in the immediate vicinity of the cape with as little delay as possible.

African Exploration Fund.—The Report of the African Exploration Committee to the Council of the Royal Geographical Society having been adopted by the Council and approved by the Subscribers at a Meeting on the 14th of June, it was determined, in accordance with the Report, to despatch a small expedition to explore the country between the East Coast and the northern end of Lake Nyassa. The expeditionary party will be commanded by Mr. Keith Johnston, the well-known Geographer, who has had two years' experience as a scientific explorer in Paraguay, and will leave England in the autumn. Starting from the end of the caravan road, now being constructed by a party of English engineers, from Dar-es-Salaam (25 miles south of Zanzibar), the Expedition will direct its course to the northern end of Lake Nyassa, a distance of 350 miles, and examine the newly-discovered Livingstone or Kondi Mountain range, reported to be 15,000 feet high, to the N.E. of the lake. Should this part of the journey be successfully performed and the resources of the party not have been exhausted, a further exploration will be made of the country (190 miles in width) lying between Nyassa and the southern end of Tanganyika.

As the extent and completeness of the proposed exploration will depend on the means at the disposal of the Committee, which at present do not reach £2000, a renewed appeal is made to the public for further support.

Donations and Annual Subscriptions may be paid to the Chief Clerk of the Royal Geographical Society, 1, Savile Row, W.; or to Messrs. Cocks, Biddulph, and Co., 43, Charing Cross, to the credit of the African Exploration Fund.

Silver in Peru.—Mr. Gibbs, the United States' Minister, has submitted to his Government the following interesting report on silver in Peru, written in reply to the interrogatories of the U.S. Monetary Commission: "Peru had up to last year no regular code of mining laws, the only ones in existence there being the modified colonial laws of Charles III. and Fernando VII., under which any person could establish his claim to a plot 200 varas square by publicly posting a description of the claim, and if the mine were a new discovery, to three additional plots of the same size adjoining the first. Each province has its special mining tribunal, subject to the Chief Court of Mines at Lima. The Peruvian Congress has, however, passed a new mining law aiming to counteract the evils of the old system under which mines could be held indefinitely, although under merely nominal working. There are over fifteen thousand mines in Peru, of which not more than six hundred are actually worked. The legal ratio between gold and silver was formerly one to fifteen and a half; but gold has been demonetised, and silver is no longer in circulation, owing to the suspension of specie payments. In 1876 gold ranged at 90 per cent. premium and silver about 56 per cent. While silver was a legal tender debts could be paid in either silver or gold; and by a decision of the courts, debts contracted previous to the suspension of specie payments by the banks, when not specially contracted to be paid in gold or silver, could be discharged in bank-notes. There is but little silver coin in Peru at present, although much plate, comprising even common bed-room utensils, is still owned by the families in the interior and in the large towns. The subsidiary copper coinage amounts to $300,000, and is legal tender to the amount of five cents. The circulation of the four associated banks is $13,000,000 against which $1,800,000 is held, mostly in silver. Their bank-notes are a legal tender for all debts, taxes and imposts. During the past ten years $36,000,000 worth of silver have passed through the Lima Mint for coinage or assay, the amount coined being over $17,000,000.

Gold was demonetised by a law of December 30 1872. National gold coin pays 3 per cent. export duty, and coin is accordingly melted into bars to evade the prohibition. There is slight production of gold, but silver is largely produced and exported as metal or ores. Gold is imported for mercantile purposes, and having to be paid for in silver the loss of

time, freight, insurance, &c., enhances the relative premium on gold. Prices in Peru have nearly doubled with the premium on gold. Coinage is unlimited, gratis, the mint receiving bullion and returning its value in coin, even supplying the copper alloy at its own expense. Silver is found in all parts of the western range of the Andes, from lat. 3° to 22° south. The most important district, Cerro del Pasco, produced between the years 1630 and 1849 $475,000,000. Mr. H. Meiggs offered to complete the railroad to the Cerro del Pasco mines. The existing road runs as far as Anahi, eighty-five miles, reaching a height of 12,220 feet above the sea, and is graded forty miles further, passing the summit at an altitude of 15,645 feet, some hundreds of feet higher than Mount Blanc. A tunnel, on the plan of the famous Sutro Tunnel, is projected at Cerro del Pasco, 150 feet below the present workings, and is calculated to open up 100,000 square yards of surface and $500,000,000 worth of fresh ore. This is but one of the many mining districts. Others of equal or greater value exist in the province of Puno, with better railroad facilities. The difficulties in the way of smelting silver under the old system were incredible, the ores being transported great distances on mules over rugged mountain paths, where the animals and their loads were often lost through a mis-step; yet in thirty years, from 1790 to 1820, 101,784,476 ounces of silver were smelted at the seven Government works. Railroad facilities and modern processes of extracting the precious metal will soon give greater production from a larger area than any other in the world. There is an immense and fluctuating export trade in ore and bullion from Peru to England, the ore exported amounting, in 1872, to 598,404*l.*; in 1873 to 45,027*l.*; in 1874 to 175,927*l.*; besides $1,600,000 in coin. In 1875, coin to the value of $2,735,000 was exported, and in August, September and October of 1876, $2,024,920."

The Population of the Globe.—Messrs. Behm and Wagner have brought out the fifth annual number of their tabular estimate of the population of the globe. We have subjected a good portion of the paper to minute examination, and, judging from the scrupulous care exhibited therein, we conclude that the whole paper is not only the best estimate of the world's population in existence, but in regard to well-known countries is very near the truth. The total population of the globe, as estimated in these annual reports, was 1424 millions in 1876, 1439 millions in 1877, and has risen this year to 1446 millions. This increase must of course be attributed almost wholly to increased accuracy in the returns.

Survey of Albert Nyanza Lake.—Mason Bey's survey of this lake in June 1877 has reduced its area considerably as compared with that executed by Romolo Gessi. Mason Bey checked his work by four astronomical positions, two at the lake's southern limit, which he lays down in 1° 10' N. latitude instead of 0° 50' N. as laid down by Gessi. It is much to be hoped that the facility and security of communication between Khartum and the lake, resulting from Gordon Pasha's measures, may lead to the hydrography of Lake Albert being thoroughly investigated, including the question of Stanley's Beatrice Gulf, and the entire region south of the Lake which is now involved in such uncertainty.

Proceedings of Geographical Societies.

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BRITISH ASSOCIATION.

GEOGRAPHICAL SECTION (E).

THE British Association for the Advancement of Science held their Annual Meeting on the 13th August at Dublin, under the Presidency of Mr. William Spottiswoode F.R.S. The Geographical Section (E) was presided over by Sir C. Wyville Thomson F.R.S., from whose opening address we have given the following extracts, relating, as they do, to subject matters to which the attention of geographers will naturally turn, considering how entirely Sir Wyville Thomson has made them his own. After referring to the chief geographical events of the past twelve months and pointing out how much they had added to our physical knowledge of the sea, the President went on to speak as follows of the general ocean circulation. It was pointed out long ago by Sir Charles Lyell that many of the most marked phenomena of the present physical condition of the globe depend upon the fact that the surface of the world is divided into two hemispheres, one of which contains nearly the whole of the dry land of this world, while the other is almost entirely covered by water. The centre of the land-hemisphere is somewhere in Great Britain, and the centre of the water hemisphere, which includes the southern sea, the South Pacific, whatever Antarctic land there may be, Australia, and the southern point of South America, is in this neighbourhood of New Zealand. With a full knowledge of the absolute continuity of the ocean we have hitherto been too much in the habit of regarding it as composed of several oceans, each possibly under special physical conditions. All recent observations have, however, shown us that the vast expanse of water which has its centre in the southern hemisphere is the one great ocean of the world, of which the Atlantic with the Arctic Sea and the North Pacific are merely northward extending gulfs; and that any physical phenomena affecting obviously one portion of its area must be regarded as one of an interdependent system of phenomena affecting the ocean as a whole.

Shallow as the stratum of water forming the ocean is—a mere film in proportion to the radius of the earth—it is very definitely split up into two layers, which, so far as all questions concerning ocean movements and the distribution of temperature is concerned, are under very different conditions. At a depth varying in different parts of the world, but averaging perhaps 500 fathoms, we arrive at a layer of water at a temperature of 40° F., and this may be regarded as a kind of neutral band separating the two layers. Above this band the temperature varies greatly over different areas, the isothermobathic lines sometimes tolerably equally distributed, and at other times crowding together towards the surface, while beneath it the temperature almost universally sinks very slowly and with increasing slowness to a minimum at the bottom.

The causes of natural phenomena, such as the movements of great masses of water, or the existence over large areas of abnormal temperature conditions, are always more or less complex, but in almost all cases

one cause appears to be so very much the most efficient that in taking a general view all others may be practically disregarded; and speaking in this sense, it may be said that the trade-winds and their modifications and counter-currents are the cause of all movements in the stratum of the ocean above the neutral layer. This system of horizontal circulation, although so enormously important in its influences upon the distribution of climate is sufficiently simple. Disregarding minor details, the great equatorial current driven from east to west across the northerly extensions of the ocean by the trade-winds, impinges upon the eastern coasts of the continents. A branch turns northwards and circles round the closed end of the Pacific, tending to curl back to the North American coast from its excess of initial velocity; and in the Atlantic, following a corresponding course, the Gulf Stream bathes the shores of Northern Europe, and a branch of it forces its way into the Arctic basin, and battling against the palæocrystic ice, keeps imperfectly open the water-way by which Nordenskjöld hopes to work his course to Behring Strait. The southern deflections are practically lost, being to a great extent, though not entirely, dissipated in the great westerly current of the southern anti-trades.

One of the most singular results of these latter investigations is the establishment of the fact that all the vast mass of water, often upwards of 2000 fathoms in thickness, below the neutral band, is moving slowly to the northward; that in fact the depths of the Atlantic, the Pacific, and the Indian Oceans are occupied by tongues of the Antarctic Sea, preserving in the main its characteristic temperatures. The maintenance of a low temperature while the temperature of the floor of the ocean must be higher, and that of the upper layers of the sea greatly higher, is in itself a conclusive proof of steady movement of the water from a cold source; and the fact that the temperature of the lower layers of water, both in the Atlantic and the Pacific, is slightly but perceptibly raised to the northward, while the continuity of every layer with a corresponding layer in the southern sea can be clearly traced, indicates the southern position of that source.

The immediate explanation of this very unexpected phenomenon seems simple. For some cause or other, as yet not fully understood, evaporation is greatly in excess of precipitation over the northern portion of the land-hemisphere, while over the water-hemisphere, and particularly over its southern portion, the reverse is the case: thus one part of the general circulation of the ocean is carried on through the atmosphere, the water being raised in vapour in the northern hemisphere, hurried by upper wind currents to the zone of low barometric pressure in the south, where it is precipitated in the form of snow or rain, and welling thence northwards in the deepest channels on account of the high specific gravity dependent on its low temperature, it supplies the place of the water which has been removed.

The cold water wells northwards, but it meets with some obstructions on its way, and these obstructions, while they prove the northward movement, if further proof was needed, bring out another law by which the distribution of ocean temperature is regulated. The deeper water sinks slowly to a minimum at the bottom, so that if we suppose the temperature at a depth of 2000 fathoms to be 36° F., the temperature at a depth of 3000 may be, say, 32°. Now, if in this case the slow current meets on its northward path a continuous barrier in the form of a sub-marine mountain ridge rising to within 2000 fathoms of the sea-surface, it is clear that all the water below a temperature of 36° will be arrested, and, however deep the basin beyond the ridge may be, the water will maintain a minimum of 36° from a depth of 2000 fathoms to the bottom. In many parts of the ocean we have most remarkable examples of the effect upon deep-sea temperature of such barriers intersecting cold indraughts, the most marked instance, perhaps, a singular chain of closed seas at different temperatures among the islands of the Malay Archipelago; but we have also a striking instance nearer home. Evaporation is greatly in excess of precipitation over the area of the Mediterranean, and, consequently, in order to keep up a supply of water to the Mediterranean, there is a constant inward current through the Straits of Gibraltar from the Atlantic: I need not at present refer to an occasional tidal counter-current. The minimum temperature of the Mediterranean is about 54° F. from a depth of 100 fathoms to the bottom. The temperature of 54° is reached in the Atlantic at the mouth of the Straits of Gibraltar at a depth of about 100 fathoms, so that in all probability future soundings will show that the free water-way through the Straits does not greatly exceed 100 fathoms in depth.

It seems now to be thoroughly established by lines of trustworthy soundings which have been run in all directions, that the average depth of the ocean is a little over 2000 fathoms, and that in all probability it nowhere exceeds 5000 fathoms. Depths beyond 4000 fathoms are rare and very local, and seem to be usually pits in the neighbourhood of volcanic islands. In all the ocean basins there are depressions extending over considerable areas where the depth reaches 3000 or a little more, and these depressions maintain a certain parallelism with the axes of the neighbouring continents.

Within 300 or 400 miles of the shore, whether in deep or in shallow water, formations are being laid down, whose materials are derived mainly from the disintegration of shore rocks, and which consequently depend for their structure and composition upon the nature and composition of the rocks which supply their materials. These deposits imbed the hard parts of the animals living on their area of deposition, and they correspond in every way with sedimentary formations with which we are familiar, of every age. In water of medium depths down to about 2000 fathoms, we have in most seas a deposit of the now well-known globigerina-ooze, formed almost entirely of the shells of foraminifera living on the sea-surface, and which after death have sunk to the bottom. This formation, which occupies a large part of the bed of the Atlantic and a considerable part of that of the Pacific and Southern seas, is very like chalk in most respects, although we are now satisfied that it is being laid down as a rule in deeper water than the chalk of the cretaceous period.

In depths beyond 2500 or 3000 fathoms no such accumulations are taking place. The shores of continents are usually too distant to supply land detritus, and although the chalk-building foraminifera are as abundant on the surface as they are elsewhere, not a shel

reaches the bottom; the carbonate of lime is entirely dissolved by the carbonic acid contained in the water during the long descent of the shells from the surface. It therefore becomes a matter of very great interest to determine what processes are going on, and what kind of formations are being laid down in these abyssal regions, which must at present occupy an area of not less than ten millions of square miles.

The tube of the sounding instrument comes up from such abysses filled with an extremely fine reddish clay, great part amorphous, but containing, when examined under the microscope, a quantity of distinctly recognisable particles, organic and inorganic. The organic particles are chiefly siliceous, and for the most part the shells or spines of radiolarians which are living abundantly on the surface of the sea, and apparently in more or less abundance at all depths. The inorganic particles are minute flakes of disintegrated pumice, and small crystalline fragments of volcanic minerals; the amorphous residue is probably principally due to the decomposition of volcanic products, and partly to the ultimate inorganic residue of decomposed organisms. There is ample evidence that this abyssal deposit is taking place with extreme slowness. Over its whole area, and more particularly in the deep water of the Pacific, the dredge or trawl brings up in large numbers nodules very irregular in shape, consisting chiefly of peroxide of iron and peroxide of manganese, deposited in concentric layers in a matrix of clay, round a nucleus formed of a shark's tooth, or a piece of bone, or an otolith, or a piece of siliceous sponge, or more frequently a fragment of pumice. These nodules are evidently formed in the clay, and the formation of the larger ones and the segregation of their material must have taken a very long time. Many of the sharks' teeth to which I have alluded as forming the nuclei of the nodules, and which are frequently brought up uncoated with foreign matter, belong to species which we have every reason to believe to be extinct. Some teeth of a species of *Carcharodon* are of enormous size, four inches across the base, and are scarcely distinguishable from the huge teeth from the tertiary beds of Malta. It is evident that these semi-fossil teeth, from their being caught up in numbers by the loaded line of the trawl, are covered by only a very thin layer of clay.

Another element in the red clay has caused great speculation and interest. If a magnet be drawn through a quantity of the fine clay well diffused in water, it will be found to have caught on its surface some very minute magnetic spherules, some apparently of metallic iron in a passive state, and some of metallic nikel. From the appearance of these particles, and from the circumstance that such magnetic dust has been already detected in the sediment of snow-water, my colleague Mr. Murray has a very strong opinion that they are of cosmic origin—excessively minute meteorites. They certainly resemble very closely the fine granules which frequently roughen the surface of the characteristic skin of meteorites, and from their composition and the circumstances under which they are found there is much to be said in favour of this view. I cannot, however, hold it entirely proved; there can be little doubt, from the universal presence of water-logged and partially-decomposed pumice on the bottom, and from the constant occurrence of particles of volcanic minerals in the clay, that the red clay is formed in a great measure by the decomposition of the lighter products of submarine volcanoes drifted about by currents, and finally becoming saturated with water and sinking; and it is well known that both iron and nickel in a metallic state are frequently present in minute quantities in igneous rocks. I think it is concievable that the metallic spherules may be derived from this source.

So far as we can judge, after a most careful comparative examination, the deposit which is at present being formed at extreme depths in the ocean does not correspond either in structure or in chemical composition with any known geological formation; and, moreover, we are inclined to believe, from a consideration of their structure and of their imbedded organic remains, that none of the older formations were laid down at nearly so great depths—that, in fact, none of these have anything of an abyssal character. These late researches tend to show that during past geological changes abyssal beds have never been exposed, and it seems highly probable that until comparatively recent geological periods such beds have not been formed.

It appears now to be a very generally received opinion among geologists—an opinion which was first brought into prominence by Professor Dana—that the "massive" eruptions which originated the mountain chains which form the skeleton of our present continents, and the depressions occupied by our present seas date from the secular cooling and contraction of the crust of the earth from a period much more remote than the deposition of the earliest of the fossiliferous rocks, and that during the period chronicled by the successive sedimentary systems, with many minor oscillations by which limited areas have been alternately elevated and depressed, the broad result has been the growth by successive steps of the original mountain chains and the extension of the continents by their denudation, and the corresponding deepening of the original grooves. If this view be correct—and it certainly appears to me that the reasoning in its favour is very cogent—it is quite possible that until comparatively recent times no part of the ocean was sufficiently deep for the formation of a characteristic abyssal deposit.

Time will not allow me even to allude to the interesting results which have been obtained from the determination of the density of sea water from different localities and different depths, and from the analysis of sea water and its contained gases, and perhaps these results have been scarcely sufficiently worked out as yet to afford safe bases for generalisation. I must, however, say a few words as to certain additions which have been made to our knowledge of the two hitherto impregnable strongholds of the frost, the regions round the North and South Poles.

The PRESIDENT then made a few remarks upon the question of the condition and nature of the North Polar Sea as deduced from various observations, and then proceeded to speak of the Antarctic regions. His remarks on this subject, together with abstracts of the various papers read at the meetings of this Section, will be given in our next number.

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FRENCH GEOGRAPHICAL SOCIETY.

June 5th, 1878.—M. VIVIEN DE SAINT MARTIN in the chair. M. Chousserie, Professor of French at the Commercial School, Galatz forwarded a copy of a work entitled *The Geography of Roumania*. Letters from M. Savorgnan de Brazza and Dr. Ballay were received, the latter stating that he had ascended the Ogowai river up to the Pubava Falls, where it shrinks to the width of 20 yards. M. DUVEYRIER read a letter from M. Masqueray, who has journeyed to the south of Arabia in order to make researches into the ethics of a sect of Muhammadans called Abadia. The ABBE DURAND then read a paper on Cashmir and Tibet.

June 19th, 1878.—M. DE QUATREFAGES, presiding. M. DUVEYRIER, Vice-President, gave an account of the Italian expedition to Shoa from the time of its organisation up to the most recent news received, which was to the effect that the Marquis Antinori was at Shoa organising a scientific station. He had obtained a grant of land on the eastern slope of the Shoa mountains, and was making zoological collections. Messrs. Chiarini and Cecchi were proposing to penetrate into the southern provinces of Shoa and to explore the upper course of the Hawash, and M. Martini hopes to join them later on. M. WOEIKOF, a Russian *savant*, gave a description of his travels in Japan, in the course of which he took 400 barometric-height observations.

Extraordinary Meeting of June 28th, 1878.—Admiral Baron DE LA RONCIERE LE NOURY, President, in the chair. The meeting was held in the large amphitheatre of the Sorbonne, which was crowded to witness the award of the medals. The large Gold Medal was awarded to Mr. Stanley for his last important African journey, and another Gold Medal to M. Vivien de Saint Martin for his geographical works, and labours, comprising the editing the *Annales des voyages* for a period of 14 years, the compiling of his valuable *Année Geographique* for 13 years and his Dictionary of Historical Geography. M. Vivien de Saint Martin is the sole survivor of the original founders of the French Geographical Society in 1821, when he was 19 years of age, and his lifetime has since been strenuously devoted to geographical science. The third Medal was awarded to Dr. Harmand, whose travels in Cambodia were briefly sketched by M. Hubert.

July 3rd, 1878.—M. DE QUATREFAGES, presiding. The death was announced of two Englishmen, Messrs. Ryder and Rothwell, while ascending the Misti Peak, a volcano upwards of 15,000 feet high and situated about six miles north-west of Arequipa, in Peru, The death was also announced of M. Frederick Harlt, Professor of Geology and Palæontologist, and head of the Geological Commission of Brazil. M. DELESSE made a few remarks on the projected Russian railway between Orenburg and Tashkent, especially with reference to the Karakum Sands, which were not so difficult to traverse. M. FRANTZ SCHRADER gave a rapid sketch of that portion of the Spanish Pyrenees between the Goritty pass to the north-west of Pampeluna and the north-west extremity of Spain. The Spanish Pyrenees, with the exception of their central part, he described as altogether inferior to the French, and as presenting a wild and steep aspect, while several peaks attain the limit of perpetual snow. Their northern spurs are short and abrupt. The three principal chains are the Cantabrian, Austurian and Gallician Pyrenees. The spurs of the latter, which run out towards the ocean, form deep valleys covered with luxuriant vegetation. Coal mines are abundant, and other minerals are also to be found.

July 17th, 1878.—M. DE QUATREFAGES presiding. M. R. CORTAMBERT announced the death of M. Adolfo de Varnhagen, Minister Plenipotentiary of Brazil to the Austrian Government, one of the most distinguished *savans* in South America, and known for his writings on the historical geography of Brazil, and the discoveries of Amerigo Vespucci. M. GRAVIER read a review of the History of French Brazil in the sixteenth century by M. Paul Goffarel, showing that the French visited Brazil before 1500 and recalling the deeds of de Gonneville, Jean Ango, Parmentier, Verrazzano and others. The second and third parts, the Organisation and Decline of the French Colonies, treat mainly of the history of the French colony of Rio de Janeiro from 1555 to 1565.

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LYONS GEOGRAPHICAL SOCIETY.

Monthly Meeting of May 16th, 1878.—M. DE LA VAISSIERE, Superior of the Mission in Madagascar, gave an account of missionary enterprise in that island, together with a sketch of his journeys. The Catholic mission was regularly established in 1861, and numbers now between 42 and 45,000 members. The length of the island is about 1700 kilometres long, by 650 wide, and its various populations number in all about four or five millions. The summits of the interior range do not rise much above 6000 feet in height. The island is tolerably rich in vegetation, and in parts very fertile, though the indolence of the inhabitants deters them from making fair use of the soil. M. de la Vaissière gave some particulars regarding the Ovas, the most powerful people in Madagascar. They fatten and export oxen in considerable quantities to Mauritius and Réunion. The currency system is exceedingly primitive, but five-franc pieces circulate generally, and are cut up into fractional parts to serve as smaller change. The inhabitants in the north are said to be cannibals, but M. de la Vaissière traversed the whole country without being molested, and even experienced great hospitality. There are neither roads nor bridges, travellers are borne on a sort of chair carried on men's backs, a kind of locomotion which is very expensive. A French house is now endeavouring to start interior navigation on one of the rivers.

M. MILSOM then read a paper on the famine in the northern provinces of China, and ascribed the present distress to the disforesting which had there taken place, and to the apathy and indolence of the Chinese government in allowing all means of communication, roads, bridges, &c., to fall into complete decay. After detailing the relief system adopted, the author concluded with a strong appeal to France for contributions.

The PRESIDENT seconded this appeal, and suggested that the Journal of the Catholic Missions, which had

collected close on 500,000 francs (£20,000) for the Indian famine, should start a similar subscription for the Chinese famine.

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ROCHEFORT GEOGRAPHICAL SOCIETY.

THE first meeting of the Rochefort Geographical Society was held on the 19th July, M. FONCIN, Vice-President of the Bordeaux Geographical Society, being in the chair. An opening address was delivered by M. FONQUIER, Professor of Philosophy at the College of Rochefort, who afterwards spoke on the subject of Canada, a country which, as an old colony, possesses great interest for Frenchmen.

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HALLE GEOGRAPHICAL SOCIETY.

June 5th, 1878.—Dr. KIRCHHOFF presiding. Dr. KOHLSCHUTTER read a paper on "A visit to the towns along the Riviera di Ponente." He explained that this term included San Remo, Mentone, Monaco and in fact all the Ligurian coast east of Nice. The three places mentioned were well protected from the north winds, the Sirocco blowing from the sea has its force mostly broken, and the Mistral, which reaches Nizza and Mentone scarcely touches San Remo. Dr. Kohlschütter entered fully into the natural characteristics of the various places and displayed a numerous collection of photographs of the places visited.

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SPANISH GEOGRAPHICAL SOCIETY.

THE *Boletin* of the Spanish Geographical Society for January 1878 contains two valuable memoirs by Don Justo Zaragoza and Dr. Hamy (the latter translated from the *Bulletin de la Société de Géographie de Paris*), on the early discoveries of the Spaniards in the South Pacific, and on the coasts of New Guinea. In a previous number *(Tomo 1.)* Señor Zaragoza had given some account of the expeditions of Memdaña and Quiros, up to the time when the latter returned from the New Hebrides to Mexico in October 1606.

The present number opens with the letter which the second in command, Luis Vaez de Torres, addressed to King Philip III. from Manilla, on the 12th of July 1607. The original is at Simancas. It is also given in Burney's voyages, and by Lord Stanley of Alderley in his Philippine Islands. Torres says that after parting company with Quiros at the bay of San Felipe y Santiago, in the island of Espiritu Santo (one of the New Hebrides) he sailed N.W. until he came to New Guinea, and coasted along the south end. He describes the country as thickly peopled, with many large harbours and rivers, and islands off the coast. He went thence to the Moluccas, passing innumerable islands.

The valuable surveys executed by Captain Moresby, in H.M.S. 'Basilisk,' proved that the eastern extreme of New Guinea did not end in a long narrow point, as shown on former maps, but in two arms enclosing a deep bay, with an archipelago of islands prolonged from the southern arm. Señor Zaragoza claims that all these details had been discovered and mapped by Torres, 270 years before.

Torres had been preceded, on the coast of New Guinea, by other Spanish Explorers, namely Saavedra in 1528, Grijalva and Alvarado in 1537, and Inigo Oriz de Retes in 1545. Of the two first there are only vague accounts, but the narrative of the voyage of Retes is more circumstantial. All appear to have been on the northern side of the island. Torres, however, made a more remarkable voyage; and it was Alexander Dalrymple who brought to light the memorial of Juan Luis Arias, shewing that Torres sailed between New Guinea and Australia. Dalrymple, therefore, gave the name of Torres to the strait. The Spanish navigator sailed to the eastern extreme of New Guinea, was unable to double it, and therefore returned through the strait which now bears his name, and along the southern coast.

It appears that Diego de Prado y Tovar was captain of the ship of Quiros, but that he deserted at Taumaco, and joined Torres. This man sent two letters, with a map of the discoveries of Torres, and some plans, to the King of Spain in 1614, from Goa. The letters are preserved at Simancas. The map is lost, but the four plans have lately been discovered at Simancas. The first represents the Bay of San Felipe y Santiago in the island of Espiritu Santo. The second is called the "ports and bays of the land of San Buenaventura;" and it is maintained that this represents the south-eastern end of New Guinea, which was re-discovered by Captain Moresby in 1873. The Milne Bay of Moresby is shown on the Spanish plan of 1606, as well as Challis Head of Moresby, which Prado calls "Cabo Fresco." Jenkins Bay is called, "Baya de San Millan." "Rocky Pass" of Moresby is "Boca de la Batalla" of the Spanish surveyor, "Buenaventura" is Basilisk Island, and Hayter Island is "Magna Margerita." Many of the other localities can also be identified. The latitude of the Spaniard is correct, namely 10¾° S. and on his chart is written "*descubierta por D. Luis Vaes de Torres, el* 18 *de julio de* 1606, *a*° *los* 10¾° *Sur*,"

The third plan is of the great bay of San Lorenzo discovered by Torres on the 10th of August 1606; which is identified with that named by Bourgainville Le Baie de l'Orangerie.

Don Francisco Coello, the President of the Spanish Geographical Society, is of opinion that the old names given to these localities by Torres in 1606 ought to be preserved. The plans, coloured like the originals, are given at the end of the *Boletin*.

In the *Boletin* of March 1878, there is an account of the exploration of part of the south-west coast of Africa in search of the site of an ancient Spanish port known in history as "Santa Cruz de Mar Pequeña." This service was performed by Captain Cesareo Fernandez-Duro, on board the steamer 'Blasco de Garay.' That officer has corrected the position of the mouth of the River Asaka, near Cape Nun, and often called Guad Nun on old charts. He has also approximately fixed the site of the old fort, as well as the mouths of the Rivers Draa and Xiliba. The *Boletin* contains a coloured chart of the part of the African coast that has been surveyed by Captain Fernandez-Duro.

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* See the map facing p. 361 of our number for December 1873.

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